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Latin-American Conference

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

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and Latin America

THE 19 Latin-American countries that have joined the Food and Agriculture Organization make up one-third of the total membership in FAO. In association with other nations of the world, they are pledged to improve the living standards and nutrition of their peoples. Thus, Latin America is a partner in FAO's efforts to achieve these objectives by ensuring an ample supply of the products of the farms, forests, and fisheries of the world.

FAO has three principal ways of helping its 57 member nations to increase production and efficient distribution of all food and agricultural products. It promotes concerted international action by recommending definite ways and means for putting the latest facts and scientific methods into practice, offers technical assistance wherever necessary, and helps member governments to formulate their food production plans by gathering the facts on the ever-changing world food and agriculture situation.

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How does FAO propose to stimulate food and agricultural production in Latin America through these means? During the current year FAO will start a series of technical programs in Latin America. Several of these have their origin in the visit of the Director-General to Latin America during the spring of 1947 and in the activities of FAO liaison officers who visited all member countries in the region during the end of 1947 and in the early part of 1948.

In the field of promoting international action, FAO has already held the first Latin-American Forestry and Forest Products Conference at Teresopolis, Brazil. This Conference reached broad agreement on the best methods of opening up the vast timber resources of all Latin-American countries. A nutrition conference will be held in July at Montevideo, Uruguay. This will be a regional technical conference designed to assist governments in making more widely available the existing knowledge of nutrition problems in Latin America. The organization of a Regional Fisheries Council to promote better development of Latin-American fisheries holds a high priority in FAO's projected activities. During the early autumn of the current year, FAO proposes to call a meeting on infestation of foodstuffs in Latin America; an international meeting on locust control problems is also scheduled for 1948. A regional conference on problems of agricultural production and distribution in Latin America is also contemplated.

In connection with the preparation of the 1950 World Census of Agriculture, a technical training center to instruct students in the latest methods of collecting agricultural statistics will be organized in Mexico City in 1948.

Technical assistance has been given to Venezuela, in the form of a special mission which investigated the vegetable oil resources of that country last January. The mission studied the possibility of exploiting industrially the wild oil-bearing palms and introducing cultivated oil seeds that would thrive under Venezuelan conditions.

Technical information has been collected and published, including current statistics of food and agriculture, special commodity studies, and reviews of the world food and agriculture situation.

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FAO is organized to carry out these activities through its technical divisions and services—Agriculture; Forestry and Forest Products; Fisheries; Nutrition; Rural Welfare; Economics; and Information.

In order to assist him in defining policies and in conducting the activities of the Organization, the Director-General plans to appoint a small number of high-ranking regional officers who will at the same time be his advisers and his representatives. Two have already been appointed for Europe and the Near East, and appointments will soon be made for Latin America and the Far East.

FAO is headed by a Director-General chosen by the annual Conference. (Sir John Boyd Orr, the first Director-General, was succeeded by Norris E. Dodd in June 1948.) The policy-making body of FAO is the annual Conference, in which each member nation has one vote. Between sessions of the Conference, the Council of FAO, comprising 18 member nations, acts for the Conference. Latin America is at present represented on the Council by Brazil, Chile, Cuba, and Mexico. It keeps the world food and agriculture situation under constant review and directs the policy of the International Emergency Food Committee, which recommends the allocation of agricultural commodities in short world supply.

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By itself FAO could make only a partial contribution towards freedom from want. But the Organization works closely with the Economic and Social Council of the United Nations and other international agencies concerned with trade, credit, monetary stabilization, labor, health, education, and other matters vital to the welfare of nations. FAO will also wish to co-operate closely with such bodies as the proposed Economic Commission for Latin America.

The Latin-American Conference on Forestry and Forest Products

Dr. Daniel de Carvalho, Minister of Agriculture for Brazil, opens the Conference. At the table, from left to right: Marcel Leloup (FAO), representing the Director-General of FAO; P. de Souza of Brazil, Secretary-General of the Conference; the Minister of Agriculture for Brazil; Teixeira Leite, Secretary of Agriculture for the State of Rio de Janeiro; and R. C. Fortunescu (FAO), Assistant Secretary-General of the Conference.

Teresopolis, 1948

THE Latin-American Conference on Forestry and Forest Products was held at Teresopolis, State of Rio de Janeiro, Brazil, 19-30 April 1948.

Located in the cool mountains overlooking the bay of Rio de Janeiro and set amidst beautiful forested surroundings, Teresopolis formed a perfect background for the Conference. Conference headquarters had been set up in the Higino Palace Hotel, where, very conveniently, the secretariat and most of the delegates also stayed.

Sponsored jointly by the Government of the United States of Brazil and FAO, the Conference was attended by delegates and observers from 19 member nations, one nonmember nation, and five intergovernmental organizations.

Countries Represented by Delegations

Brazil	Netherlands
Chile	Nicaragua
Cuba	Paraguay
Dominican Republic	Peru
France	United Kingdom
Guatemala	United States of America
Honduras	Uruguay
Mexico	Venezuela

Countries Represented by Observers

Argentina	Italy
Canada	Portugal

International and Intergovernmental Organizations Sending Representatives

United Nations
UNESCO
International Labour Organisation
Pan American Union
Inter-American Institute of Agricultural Sciences

The Minister of Australia in Brazil also attended the final plenary session.

The Conference was opened by the Brazilian Minister of Agriculture, Dr. Daniel de Carvalho, in the Casino Hall of the Higino Palace Hotel before a full assembly of delegates and visitors. On behalf of his government His Excellency welcomed the representatives of countries and organizations which had been able to accept the invitations of FAO and the Brazilian Government. He referred to Brazil's ideals of internationalism and stressed the United Nations' contribution to peace and a better social order in the world. His words of welcome were echoed by Dr. Teixeira Leite on behalf of the Governor of the State of Rio de Janeiro.

Mr. Leloup, Director of FAO's Division of Forestry and Forest Products and the personal representative of the Director-General, asked the Secretary-General of the Conference, Dr. Paulo de Souza, to read Sir John Boyd Orr's message of welcome. Mr. Leloup then proceeded to outline the scientific and practical bases for the Conference's deliberations, within the

general framework of the world situation as it affects forestry and forest products. His address is reproduced elsewhere in this issue.

Dr. Bandeira de Mello, on behalf of the Director-General of the International Labour Organisation, stressed the relationship between development of forest resources and labor problems in Latin America. He expressed the hope that close collaboration with the International Refugee Organization would be possible.

Señor Hector Hernández Carabaño of the Venezuelan delegation drew attention to the need for a dynamic approach to the problem of developing the forest resources of Latin America.

The first plenary session closed with the unanimous election of Dr. Daniel de Carvalho as Honorary President of the Conference and of Dr. Virgilio Gualberto, President of the National Pine Institute of Brazil, as Executive Chairman. In expressing his appreciation, Dr. Gualberto said that he hoped that a closer and more direct contact between technicians, industrialists, and foresters would develop in Latin America and that technicians would become more concerned with the practical side of their problem.

The officers and secretariat of the Conference were as follows:

Honorary President:	Daniel de Carvalho (Brazil)
Executive Chairman:	Virgilio Gualberto (Brazil)
Vice-Chairmen:	Francisco Guerra y Morales (Guatemala)
	Hector Lazos (Mexico)
Rapporteur-General:	Gabriel M. Caldevilla (Uruguay)
Representative of Director-General, FAO:	Marcel Leloup (FAO)
Secretary-General:	Paulo Ferreira de Souza (Brazil)
Assistant Secretary-General:	Radu Fortunescu (FAO)
Administrative Secretary:	Morris Greene (FAO)

Following informal discussions held prior to the Conference with interested governments, a suggested general agenda had been drafted by FAO. After examination and acceptance by the Conference Steering Committee, composed of heads of all delegations, this agenda was adopted at the second plenary session as a guide to the Conference deliberations. It provided for discussion of:

A. *Utilization of Forest Resources*
   1. Current position
   2. Extent to which utilization and development can be expanded
   3. Measures necessary to attain this expansion

B. *Protection and Development of Forest Resources*
   1. Organization of Forest Services
   2. Forest research
   3. Personnel
   4. Forest law
   5. Forest inventories
   6. Reforestation problems
   7. Developing public interest

Accordingly, the Conference apportioned its work between two Commissions, the first dealing with utilization of Latin-American forest resources and the second devoting itself to the problems of forest management and forest administration. The Steering Committee co-ordinated the efforts of the two Commissions and of the whole Conference.

The officers of the Commissions were:

Commission I

Chairman:	Hector Hernández Carabaño (Venezuela)
Vice-Chairman:	Gildo Guerrero Insfran (Paraguay)
Rapporteur:	Raul Gonzales Guzman (Chile)
Secretary:	L. J. Vernell (FAO)

Commission II

Chairman:	Edward I. Kotok (U.S.A.)
Vice-Chairman:	Felipe Livori Larco (Peru)
Rapporteur:	Luis A. Garcia Villafañe (Venezuela)
Secretary:	Toni François (FAO)

The Commissions held daily sessions, 20-23 April. Committees were appointed by each to study particular problems: a Research Committee under the chairmanship of Mr. Muller (U.S.A.), a Committee on Industrialization and Trade under Señor Pereira (Brazil), and a third on Training of Personnel under Señor Villafañe (Venezuela). Working groups were also established, as occasion demanded, for the purpose of drafting resolutions and recommendations.

After the deliberations of the first week, the delegates were given an opportunity over the week end to visit the National Park at Teresopolis and other local places of interest. Meanwhile the rapporteurs and secretaries of Commissions were drafting reports embodying both the sense of the discussions and the preliminary recommendations.

These draft reports were examined in detail and concrete recommendations agreed on at the Commission sessions on Monday, 26 April. Revised drafts of the Commission reports were further discussed on 28 and 29 April and final texts were accepted.

The Steering Committee held two meetings on Thursday, 29 April, to deal with controversial points that had arisen. Complete agreement was reached on all but one recommendation, regarding which a note is contained in the text of the report. The Steering Committee concluded by approving the draft final report for submission to the full Conference. This was presented to the plenary session of the Conference by the Rapporteur-General on 30 April and adopted unanimously.

The final report, which contains 26 resolutions, addressed to governments, to FAO, and to other international organizations, reflects the large measure of agreement reached among the delegates of all participating governments.

As the Conference did not have time to deal with all the problems which presented themselves, it was content to limit its ambitions. Nevertheless it did consider that its deliberations established a sound starting point for further activities. Above all, the meetings of the Conference made possible valuable contacts that will lead to further consultations on technical and economic matters pertaining to forestry and forest products. Delegates expressed the hope that at the next Latin-American Conference, which they had recommended to be held in 1950, delegations would arrive more fully briefed to discuss economic and trade questions.

The spirit of accord reached as the result of the proceedings of the Conference was reflected in the speeches made at the concluding plenary session, which was attended by the personal representative of the President of the United States of Brazil and by representatives of the Governor of the State of Rio de Janeiro and of Federal and local authorities. The Minister of Agriculture hailed the Latin-American Conference on Forestry and Forest Products as a true token of inter-American understanding and co-operation. "The Americas," he said, "are determined to solve their problems at conference tables and not on battlefields." He expressed his confidence that the results of the Conference would have far-reaching value, not only for Brazil but for the whole world.

Before the proceedings ceased, the delegate of Guatemala formally expressed the gratitude of all members of the Conference to the Government of Brazil for its generous hospitality and for the work of the government personnel and members of the National Pine Institute who serviced the Conference. The success of the Conference was in no small measure due to their unstinted efforts.

Members of the Conference were presented to the President of the Republic, General Eurico Gaspar Dutra, at the Palacio de Catete in Rio de Janeiro on 27 April. Later in the same day they were received at the Palacio da Itamaraty by the Minister of External Relations.

Message from Sir John Boyd Orr

Director-General of FAO

TODAY the Latin-American Forestry and Forest Products Conference opens in Teresopolis, thanks to the generous hospitality of the Government of the United States of Brazil. It is the first of three intergovernmental meetings which it has been FAO's privilege to organize in Latin America for 1948.

A year ago, when I visited Latin America and planned these gatherings with you, I had hoped that I would be able to return and renew the inspiring contacts with your people, and personally take an active part in work for the development of this region, the result of which I hope will come to be regarded as one of the outstanding achievements of the twentieth century.

Unfortunately, I have not been able to come, but I am content to know that I will be represented by M. Leloup, my colleague and friend who, distinguished already in his native France, has succeeded, in less than two years, in winning general recognition for his ability, vision, and drive and for his efficient direction of FAO's Division of Forestry and Forest Products.

It is my hope that this Conference will be able to chart a course both for the commercial development of Latin America's forests and for their maintenance and continued improvement through the application of modern scientific knowledge. There are many things which will need to be done to achieve these objectives and you will be devoting the next days to a discussion of these measures.

Most important for ultimate success is that the first step should be right. Personally, I believe this first step to be the securing in each country of a forest administration as an influential government agency, dealing with all aspects of forest management and of the production, utilization, and distribution of forest products, properly staffed and adequate to take care of the millions of hectares which grow trees or which should grow trees. Without such an administration, all your decisions may well be just so much paper. But with forest services adequately financed to carry out their assignments, the rest will come as a matter of course, because your foresters must and will see to it, as foresters have done in other countries, that the necessary measures are taken.

Forest services are government agencies. But the successful organization of these services is not solely dependent on the comprehension and goodwill of presidents, ministers, and civil servants. It is vital that the peoples living on the land and in the cities of this vast area should come to understand what the existence of well-managed forests can do for their water supplies and for their agriculture and industries, and how much wealth, employment, and industrial opportunity each and every one can expect from the wise and well-planned development of Latin America's forest resources.

The discussions at the Conference should make clear the great importance of forests in Latin-American countries and the steps which should be taken for their development.

The Latin-American countries have today a challenging opportunity. In Europe, Asia, and North America there has always been in the past intensive destruction of forests before wiser councils prevailed, and before enlightened measures were taken to conserve and utilize to the best advantage what was left and to repair the damage done.

To some extent, the same process of destruction has already taken place around your big cities, but the greater part of your forests is still intact. I understand that about 800 million hectares, an area almost twice as large as all Europe, is available for development. It depends upon you whether it is to become one of the world's great assets in mankind's continuous fight for economic and social betterment.

There exists today a vast field of knowledge about the mistakes to be avoided and about proved methods in forestry and wood utilization which could, and should, be applied in the development of new forest resources and industries.

It gives me pleasure to say that FAO, through its

Division of Forestry and Forest Products, is prepared to assist in every way it can in the development of your plans and projects.

The International Timber Conference called by FAO in Europe in 1947 achieved great results in getting agreement of both exporting and importing countries on plans which have made a great contribution to easing the timber shortage in Europe. It is my hope that this Conference in Latin America will be successful both in improving the conditions in that area and in contributing to the alleviation of the world timber shortage.

Latin-American Forest Development

Opening Address by the Director of FAO's Division of Forestry and Forest Products

WHEN we examine the forest situation in Latin America, we find surprisingly different opinions held.

On the one hand, statistics show that this region possesses a forested surface of more than 800 million hectares, which constitutes about 40 percent of the total land area. The very small output per hectare which is presently extracted, about 0.2 cubic meters, implies that vast resources await only man's pleasure to succor the economic life of Latin America.

On the other hand, many eminent specialists in this field decry the apparent abundance which these figures suggest. They point to the ravages caused by irresponsible cutting and by fire in clearing land for agriculture and grazing, which are often concentrated on relatively restricted areas. They point also to the inevitable results of forest deterioration, the violent floods which follow on periods of drought, sweeping away unstable topsoil, eroding mountain slopes, and spreading thick beds of silt over fertile land and in reservoirs for hydroelectric power plants. They point to the lowering of the water table which has already deprived large cities of their water supplies, and lastly, to the dearth of wood suffered by many cities and regions, because all the forests which were easily accessible had been rashly destroyed. They cite instances even from the richest parts of the Amazon Basin, where heavy cutting along the banks of rivers and the removal of valuable species has left the forests impoverished and sometimes caused extensive silting of waterways.

The truth, Gentlemen, no doubt lies somewhere midway between these two extreme views. Even the greatest pessimists admit that vast forest resources lie hidden in the hinterland of Latin America waiting for their potentialities to be recognized, and that under proper management quite a considerable amount of timber could be taken even from forests on mountain slopes without jeopardizing their future or the soil stability.

Besides, Latin America covers a very wide area and it would be wrong to consider it as an entity. Each country, each region has its special forest problems, conditioned by the nature of the soil, the climate, and the topography. Certain aspects of these problems are, however, common to all. The bond uniting the countries of Latin America imposes on them an obligation to seek common solutions of these aspects, an obligation which appears to have been recognized by them since they are represented at this Conference. Each particular problem should therefore be viewed in this light.

To sum up briefly both schools of thought, one may perhaps say that in most countries up to the present time the more readily accessible forest resources have been exploited without thought of their replacement or regard for the results of their disappearance but that the resources more difficult of access, and doubtless of greater extent, have been entirely neglected.

Need for Developing Forest Industries

The moment seems to have arrived to remedy this situation; vigorous action is most urgently needed.

Many countries of Latin America are well aware of this urgency. Many of them are in process of organizing a rational development of their forest domain. Many governments have set up agencies to undertake or study projects for industrial development in all branches of wood utilization.

Paradoxical though it may sound, there is in effect a shortage of timber in Latin America. In all too many localities this applies even to fuelwood and charcoal. The need to import industrial wood from abroad places too heavy a burden on national budgets to absolve governments from the necessity of facing the problem of working untouched forests with a genuine desire to find a solution.

If no remedy is found for this shortage, the problem will become more acute as Latin-American countries strive to develop their economy and industries. We must not fail to remember that the industrial development of a country calls not only for steel, machinery, and various metals but also particularly for timber. So much so, that a timber deficit, and more especially a shortage of softwoods, with which Latin America is relatively poorly endowed, can constitute a veritable barrier to industrial development and, in general, to the economic and social advancement of a country.

The remedy for this situation evidently lies in research and in the rapid development of new timber resources. Since we especially allude to softwoods here, the proper management and wise working of existing stands becomes imperative. At the same time we should search among the great variety of tropical hardwoods for such species as may be used under the same conditions as conifers and which may eventually be substituted for them in all ordinary uses.

On the other hand, haphazard cutting of the forest tracts that are still within reach of centers of population must be strictly controlled if we do not want to see an increase in erosion and a decline in soil fertility which might eventually deprive such centers of their very means of existence.

Granted then that action is necessary, the present moment seems particularly propitious for getting things started.

In view of FAO's responsibilities on the world level, it is this Organization's duty to arouse attention in Latin America to the importance of developing the natural forest resources.

The world is short of timber. Europe particularly is at present passing through a serious crisis and the findings of recent conferences held on that continent indicate that one should not even speak of this as a temporary crisis but as a situation likely to last several decades. This was assuredly the thought of delegates from European nations assembled last year at Marianske Lazne, when they recommended that FAO should convene further conferences in other parts of the world, and expressed the hope that all governments which still possess untapped resources would take note of growing world requirements for forest products.

Under present circumstances, then, the yield from virgin forests may well find outlets in world trade. If the expansion of extraction and forest industries can be undertaken rapidly, the credits which are the chief prerequisite for such expansion should be readily forthcoming since good interest and a rapid amortization of capital are likely.

It is not necessary to dwell on the economic and social benefits which countries can derive from industrial development. Increase of foreign exchange, an increased circulation of money, new sources of employment and income, making profitable those regions which have hitherto been unproductive—these, gentlemen, are some of the gains to be secured, and they are not in the realm of Utopia but may be realized within a reasonable time.

Forests still untouched and now without profit to the countries that possess them have by no means an unimportant role to play in the economic expansion which is so rapidly taking shape in other fields. In turn, this economic expansion, stimulated by an abundant flow of forest products—without which it would be gravely hampered, if not rendered impossible—will engender wider domestic markets for these products. The development of domestic markets, as well as of international markets, will thus assure a definite outlet for the products of newly developed industries. We are not therefore thinking in terms of a temporary prosperity for the forest industries which we are advocating. Present economic trends promise that stability which is fundamental to a country's well-being. They also promise the possibility of further expansion which is looked for by countries well on the way to economic advancement.

There is one objection to this picture of Latin America on the threshold of great possibilities.

These new industries which we want to create, this "timber-rush" which sounds so attractive, all these new developments—will they not lead to sheer overcutting of the forests of this continent, aggravate the damage caused by deforestation, and later lead to shortages of essential wood on the domestic markets?

The answer to this objection is clear.

There is a principle which must be applied to the forests of Latin America to limit the cutting to be carried out there. It is the principle which I have already stated at Marianske Lazne and which should be made to apply to the forests of the entire globe. This is, that "forests are to be regarded as a legacy from preceding generations to the present one, which the latter must pass on to future generations intact, if not increased." All excessive exploitation made for purely commercial ends which diminishes this forest capital is contrary to this principle and must be absolutely prohibited.

However, in the majority of cases it will be found that the opening up of untouched forests, encumbered as they are with many decaying trees, requires temporary overcutting. This overcutting is indeed a necessity. It is the only means of converting unproductive capital, annual growth being counterbalanced by natural loss and decay, into capital whose normal increment can be removed in periodic fellings. It goes without saying that initial cutting must be carried out in accordance with prescribed silvicultural practices.

It is precisely this surplus timber, forthcoming

Delegates greeting Dr. Daniel de Carvalho, Minister of Agriculture for Brazil and Honorary President of the Conference, before the Higino Palace Hotel, Teresopolis.

when virgin forests are opened up, that could provide the products to feed foreign markets during the period of the present acute shortage. Later, the normal, steady yield from the forest capital now rendered productive should satisfy domestic demands, and still leave a sufficient quantity to supply, at least to a certain extent, foreign customers.

In brief, the solution for the development of the forest industries of Latin America is to base this development on the exploitation of the long accumulated resources of virgin forests. There will follow a steady development of production, based on sustained-yield forest management, and assured of a market owing to an expanded and thriving domestic demand.

Development Problems

The difficulties standing in the way of this program fall into two classes.

First of all, there are those which I may describe as technical and commercial. They pertain to the basic necessities, to means of communication, machinery, logging and transport equipment, personnel, and financing of new enterprises devoted to this development work. Then there is the problem of opening up permanent markets and outlets for products so that enterprises may be assured a stable future in the overall trade plan, and this also requires knowledge of the qualities of the woods to be exploited and of their possible end-uses in particular branches of industry.

Then, on the other hand, there are administrative, legislative, and scientific problems. No enterprise can be started without the assurance that an adequate supply of raw material can be found within a reasonable distance, so as to maintain production not just for a few years but on a sound permanent basis. This implies that the forest, the source of this raw material, must first have been surveyed, and then be managed according to properly prescribed rules which will assure a sustained yield. The forest must also be protected against natural hazards, particularly fire. Regulations must be imposed which may limit cutting rights and the rights of forest owners. Proper working methods must be laid down, and, above all, an adequate personnel is required for determining and applying all these methods. This personnel must, at the same time, assume responsibility for reforestation and soil protection, which pose especially difficult problems in certain regions.

It is only by resolving these two types of problems that any answer can be forthcoming to the whole problem confronting this Conference. To solve one without the other, and especially the first without taking into account the second, would mean a country's engaging in just that sort of haphazard forest destruction whose unfortunate consequences I have already described. Furthermore, no forest enterprise has any prospect of enduring success unless it be assured a continuous supply of raw material over an indefinite period. It may often require the establishment of new settlements and only an assurance of permanency can give such new population centers a chance of prosperity.

Government Co-operation Essential

If the Conference concludes, as I think it will, that these are the questions which have to be examined, it will adopt the draft agenda* which FAO has prepared and which envisages the establishment of two commissions, each entrusted with the study of one of these two kinds of problems.

The results which the present Conference can hope to achieve depend entirely upon the Conference itself.

I consider that it is necessary, however, to draw attention to one important point. Whatever the conclusions arrived at, they can only be of practical value if the governments represented here will make every effort to ensure their application in their respective countries.

I pointed out a short time ago that local conditions differed greatly throughout this large region. If we consider those countries where forest management and exploitation are practiced under the best technical and scientific conditions—and even there, much progress is still to be made—we see that the methods employed and the rules applied in North America, for instance, are not suitable for Europe and that in Europe itself, the methods used in the northern countries are not suitable for the southern countries. Certainly there are general principles, such as that of sustained yield already mentioned, which all countries must adopt as a golden rule; but the means of achieving this goal are bound to be different in various parts of the world.

The implication is that the proper methods must be determined for each country or for each region by specialists having a thorough knowledge not only of the climate and vegetation but also of the social customs and economic requirements. It will be a protracted job since the cycle of forest evolution can extend over many human generations.

Help from abroad and study of methods applied by foreign countries may certainly be quite useful. But only a body of specialists with thorough knowledge of the country which they are serving are really able to set up an organization to solve that country's particular problems. Undoubtedly, the success achieved by those countries most advanced in forestry practice has been due to the long succession of such specialists who have been entirely devoted to their work.

An extremely important point in dealing with forest problems, and one generally little appreciated, is that specialists require twofold support: first, from their governments, whose basic duty it is to appreciate all the complex social and economic implications of a proper forest administration and who should therefore strive to help specialists in their task by every means possible; secondly, from public opinion, which must be educated and which is too often blind to the problems that exist. Such education must be promoted constantly by governments. The aid of the teaching profession, which can profoundly influence the outlook of the people, must be enlisted. Governments should also seek the active support of local authorities who, because of the position they occupy, can exert a beneficial social influence.

The onus of carrying out the recommendations on which this Conference agrees will fall primarily on governments.

However, this burden will be lighter if countries, after having recognized here the importance of collaboration in forestry matters, will strive towards per-

*See page 96.

A view of the Plenary Session Hall.

manent mutual co-operation in achieving the aims which are proposed. Such collaboration is indeed absolutely necessary in a number of fields: for example, in research work in the field of wood technology and silvicultural methods; in making surveys and drawing up forest inventories; in the formulation of appropriate laws and regulations suited to particular local conditions; in the exchange of information with a view to avoiding violent market fluctuations and co-ordination of the development of forest industries.

If collaboration between the countries of Latin America is restricted to conferences only, it can have no lasting effect. To be of practical value, there must be continuity in this collaboration. I shall confine myself here to citing as an example the decision taken by the European countries, gathered last year at Marianske Lazne. They realized that for them, too, regional co-operation was a necessity and decided to set up a European Commission. From their co-ordinated efforts they have already obtained good results.

FAO Assistance

FAO wants to assist in the co-ordination of the efforts put forth by the Latin-American countries themselves, and to render all help which is within its power to facilitate the task of the governments.

It has already been decided to set up a regional FAO office in Latin America and the Forestry and Forest Products Division will be effectively represented in this office. What are these representatives going to do? This Conference can advise on that and draw up a practical program for them. Their aim, however, will be basically the same as that of FAO, which is to strive towards improving the standard of living of all the peoples of Latin America, through the progressive development of insufficiently used resources.

In this way Latin-American forest activities can be integrated into the wider international organization which the Forestry and Forest Products Division is attempting to establish. This region, occupying as it does a position of great importance in the future of the world, can benefit from the work of conferences and international congresses organized by the agencies interested in its development. Through its publications FAO can also assist all classes of the community to gain a better understanding of what the forest means as a source of income and as an indispensable element in soil protection and agriculture. Lastly, FAO's technical committees can study the specific problems of this vast region and give advice when governments so request.

There are many different organizations interested in scientific and practical forestry problems of the various countries. Their activities can be integrated in the larger field of activities of FAO and will thus gain added authority.

Role of the Conference

The Conference which opens today and which is the first of its kind for Latin America, will certainly not have been without value even if its only achievement were to arouse permanent interest in forestry conditions in this region; but there are more tangible results which the delegates assembled here have a right to expect. It lies with them to suggest concrete solutions and to find means by which the work started at Teresopolis can be assured of being carried on in the future.

But in drawing up any plans for the future, the delegates must always keep in mind the two aspects of the whole problem they have to resolve: on the one hand, the development of the vast potential resources which can contribute greatly to the economic progress of Latin America; and, on the other hand, using these resources wisely so that they may continually be renewed for the prosperity of future generations.

The solutions which this Conference arrives at, Gentlemen, will be of import not only in the years immediately ahead and to the countries represented here; they will inevitably influence the far future of this great region and of the human race as a whole.

Results of the Conference

Foundations for a Common Latin-American Forest Policy

THE recommendations adopted by the delegates to the Latin-American Conference on Forestry and Forest Products at Teresopolis appear elsewhere in this issue. It may be asked, however, whether any concrete action has been taken beyond these recommendations towards exploiting and rationally developing the forest resources of Latin America. In sponsoring this Conference, one of the purposes of FAO was to focus world attention on the value of these resources and on the complexity of the problem presented by their exploitation. But that was not the full measure of its aspirations. It wished to achieve concrete action; this wish was shared by all delegates to the Conference.

Despite the difficulties which came to light during lengthy discussions in the commissions, general agreement was reached as to possible solutions and the means to be applied.

The determination of the Conference that concrete results should be achieved is evidenced from the very beginning of its report. The Preamble, which was carefully discussed, asserts the clearly defined forest policy which the countries of Latin America intend to pursue:

Preamble

1. The wealth of natural resources latent in the countries of Latin America must be harnessed to postwar reconstruction. Thereby all the nations of Latin America will have a sufficiency of forest products for their own economic development, while contributing to the well-being of the whole world with that part of their production which exceeds their own needs.
2. Present circumstances are particularly favorable to the rational development of the forests of Latin America, and countries are offered a great opportunity of taking advantage of the abundance with which nature has endowed them.
3. The reason is the world shortage of timber which promises to persist for many years to come, notwithstanding certain difficulties in distribution of existing stocks due to monetary situations. At the same time, the expanding economy which all peoples desire must gradually produce an ever-increasing demand for timber and other wood commodities.
4. The problems of forestry and forest products facing the Latin-American countries were found by this Conference to fall into two closely interrelated groups:

   On the one hand, consideration was given to questions relating to the opening up of untouched or little-developed forests, thus stimulating the economic and social development of the Latin-American countries.

   On the other hand, the Conference discussed the necessity for bringing these forests, and others already being exploited, under proper management. This is a fundamental necessity in order to avoid not only the rapid dissipation of forest resources but also the havoc of erosion, from which many parts of the Latin-American continent are already suffering.
5. The Conference therefore undertook a study of these two groups of problems in two separate Commissions. The findings of these Commissions, together with the recommendations resulting from their deliberations, are embodied in Chapters I and II of this report.
6. The Conference fully recognizes that Latin-American forests should be utilized in accordance with modern scientific and mechanical concepts, and in such ways as to raise the standards of living of local populations to a level compatible with human dignity.
7. The Conference, accordingly, recognizes the necessity for continued and increased aid and guidance from international technical organizations, especially those concerned with forestry and forest resources.
8. The Conference firmly believes that forests and their products should not be exploited by primitive or colonial* methods, but that the Latin-American countries should have access to all existing technical forestry knowledge and to the necessary mechanical equipment. For this purpose, such financial assistance from appropriate international bodies should be available as to ensure the development of the forest resources of Latin-American countries on a sound rational basis, thus contributing to the welfare and aspirations of all.
9. This is the first occasion on which the Latin-American countries have met in a conference especially to consider problems of forestry and forest products. The Conference has achieved a large measure of agreement. It wishes to avoid the possibility that its recommendations may not be put into effect by the various governments and organizations to whom they are addressed.
10. Accordingly, it is agreed that
    (a) the report and resolutions of the Conference shall be brought by each delegation to the attention of its government for immediate consideration.
    (b) the report and resolutions shall also be laid before the Council and the Conference of the Food and Agriculture Organization of the United Nations, with the suggestion that the necessary steps for implementing the recom-

*The words of the original Spanish text that are literally translated in the English version by "primitive" and "colonial" refer, in accordance with Spanish usage, solely to the technical and economic aspects of the methods employed in forest exploitation.

mendations, both with governments and with other international bodies, be properly co-ordinated.

(c) each delegation shall suggest that as wide publicity as possible be given to the results of the Conference and to the principles inherent in its report, with the aim of enlightening the general public as to the importance and urgency of the forest problems of Latin America.

The Conference adopted a number of recommendations to ensure that the activities which received their initial impetus from the Conference will be carried through. In these recommendations, FAO was urged to establish a Forestry and Forest Products Working Group for Latin America and governments were urged to create a Latin-American Forestry and Forest Products Commission. With these two bodies would rest the responsibility for continuing the work begun by the Conference and maintaining that co-operation among countries, the necessity for which was recognized at Teresopolis by the countries themselves. Governments were also called upon to draw up without further delay development plans based on the principles set forth by the Conference. These will be examined, together with results already attained, at a second Latin-American Conference, planned for 1950.

These are concrete proposals, which can be implemented within a relatively short time; as experience in Europe has already shown, plans of this nature can be expected to lead to tangible results. Despite the difference in circumstances and in the problems to be dealt with, it is confidently hoped that the same beneficial results will accrue for Latin America.

But the will of the delegates at Teresopolis that positive action should be taken is further stressed by the practical side of the recommendations produced by the debates of the Conference. Having recognized that, if intensive forest exploitation in Latin America is to produce substantial and lasting benefits for the countries and their peoples, it is important that such exploitation be adequately regulated and based on rational management of forests in order to ensure the maximum sustained yield. The Conference applied itself to defining the elements essential to the achievement of these results.

This was the task of Commission II. The business of this Commission, despite minor differences on points of detail, was generally conducted in an atmosphere of unanimity, clearly indicative of the agreement of all delegates upon the foundations essential for the development of Latin-American forests and the obstacles to be overcome.

However, the Commission was not content merely to note these obstacles and the need for remedying them. It also indicated the manner in which they could be remedied, the principles to follow, and the practical steps to take. One of the most striking examples of the practical side of this Commission's debates was the passage in its report pertaining to the training of forestry personnel; the subcommittee to which this matter was referred recommended: first, short-term measures, which can be readily implemented by governments or by FAO, for the training of forest engineers abroad or the creation of a nucleus of forest engineers, subordinate staff, and specialists in silviculture or forest industries, with whatever personnel

Dr. Virgilio Gualberto of Brazil, Executive Chairman of the Conference, addressing the delegates.

is already available in each country; second, a longer-term program, aiming at full training of the forest and timber engineers and technicians needed in each country, and the establishment of a central Latin-American Institute which would be both a research center and an institute of technical learning, at university level.

The same practical spirit marked the recommendations on the organization of forest services and research work, on forest law, forest inventories, and reforestation problems. The Conference requested FAO to lend its assistance to the countries concerned, through the publication and distribution of publications on forest inventories and forest law.

This work is already a part of the FAO's activities, and the interest shown by the Conference is a valuable incentive to pursue it to a rapid conclusion. In this same connection, other noteworthy recommendations are those dealing with the provision by FAO of experts specializing in the various subjects, especially in connection with the 1950 Agricultural Census. These recommendations are also in line with the established policy of this Organization, from which it expects the most valuable results.

The discussions in Commission I went beyond the basic question of developing forestry resources. The foundations having been laid, they had to be built upon, and the matter of the architectural style might well give rise to protracted discussion. The debates were spirited, but animated throughout by a spirit of co-operation. The attainment of common solutions is therefore significant, as well as the fact that these solutions were reached with the same practical spirit which prevailed at the discussions of Commission II.

Commission I was successful in clearly indicating a program of action for the proposed Working Group and for the Latin-American Forestry and Forest

Products Commission. Finding that material, equipment, and financial resources were lacking to carry out the vast programs contemplated or in preparation in many countries, Commission I indicated the means for overcoming these obstacles.

A suggestion was made requesting each of the governments involved to report on conditions in their countries and to compile lists of requirements for the proper development, utilization, and conservation of their forest resources. These reports and lists will be reviewed and co-ordinated by FAO, in close co-operation with the United Nations Economic Commission for Latin America. This report will make it possible to present to international organizations the needs of the region.

One especially significant point gained unanimous approval: the integration of forest industries. This idea was universally accepted by delegates determined to intensify forest exploitation, ensure the better utilization of all forest products, and decrease production costs, while basing development on forest areas carefully managed according to the principle of sustained yield. This acceptance opens up to FAO, its technical committees, its working groups, particularly the Latin-American working group, and the governments themselves, wide fields of activity which should be boldly entered upon. Recommendations on this highly important matter constitute one of the principal achievements of the Teresopolis Conference. If they are carried out, splendid results can be expected.

Stress was laid upon the importance of close co-operation among international organizations concerned with the development of Latin America. A number of these organizations, other than FAO, are mentioned in the text and recommendations of the report: the United Nations Economic Commission for Latin America, the International Bank for Reconstruction and Development, the United Nations Educational, Scientific and Cultural Organization, and the Pan American Union.

It is of course clear that the development of the forest resources of Latin America implies first and foremost the need for technical studies as a basis on which to build. The economic and social progress which can and should derive from the utilization of these resources is a part of the general social and economic development of the Latin-American region, and cannot be developed independently of the whole. The Conference expressed this thought by stating in the final pages of its report that education of the public with regard to forestry, so necessary to support the activities of forest services and the enactment of intelligent forest legislation, is only one phase of general public education, which in many countries is best served by the reduction of illiteracy and the general promotion of knowledge.

FAO is now called upon to continue close collaboration with all international bodies which, although they do not have the same specific aims, are in possession of some of the means indispensable to their achievement.

No doubt, as FAO's Director of the Forestry and Forest Products Division remarked in his opening address, and as was repeated in the preamble to the report, the initiative and the heaviest responsibilities now lie with each individual government. But the Conference has offered clear advice and has shown the type of assistance governments can expect from international organizations.

Above all, the Conference was a striking demonstration of what collaboration among countries can accomplish. It indicated what can be done in the future if the recommendations of Teresopolis are carried out. The call for co-operative effort found clear expression in the communication presented to the Conference by the French delegation which, in making available for immediate service to other countries all research stations, laboratories, and other agencies at the disposal of its government, concluded as follows:

"We must not forget that the communities of tropical countries have in the past distributed within the zone numerous useful plants, which today are indispensable to the existence of tropical populations and have contributed greatly to their wealth. American forests have been particularly generous with gifts of all sorts that have enriched tropical agriculture: the hevea in Indo-Malaya, quinine in the Dutch East Indies, cocoa in Africa, and great quantities of fruit trees whose fruits are well known everywhere. In return, Africa has given the Americas its coffee trees, Indo-Malaya its oil-palms, and so forth.

"All these exchanges have helped in the development of human life in the tropics. With forest trees, too, one may expect that such exchanges will prove similarly beneficial.

"Let us hope that co-operation in forestry among tropical countries will be awakened and heightened after conferences such as this."

Officers of Commission II. Behind the table from left to right: T. François (FAO), Secretary; E. I. Kotok of the United States of America; F. L. Larco of Peru; and L. A. Garcia Villafañe of Venezuela, Rapporteur.

Resolutions

Adopted by the Conference

UTILIZATION OF FOREST RESOURCES

I. Development Plans

THE CONFERENCE,

RECOGNIZING that use should be made of the forest resources of Latin America on a rational basis, each country acting in accordance with its possibilities,

RECOMMENDS that all interested governments of Latin America draw up concrete plans for the development of their forest resources, by successive stages. FAO should make available all possible technical assistance and advice to this end as governments may request. The plans should embody the principles contained in the findings of this Conference, taking into account the particular circumstances of each country.

II. Special Requirements

THE CONFERENCE,

RECOGNIZING that a more intensive forest output and utilization, and a greater production of a wide range of manufactured wood products call for large amounts of equipment and materials, and that under present conditions of economic stress there are many competing claims for such equipment;

RECOGNIZING also the advantages of programs and plans established by interested governments in consultation with one another, drawn up on a comparable basis, with the advice of qualified technicians;

SUGGESTS (a) that all interested Latin-American governments present to FAO reports on their respective circumstances, their immediate requirements, and items in short supply for the better development, utilization, and protection of their forest resources, (b) that these lists and reports be reviewed and co-ordinated by FAO, in close consultation and accord with the United Nations Economic Commission for Latin America or other appropriate international agencies, with the aim of preparing a coherent and comprehensive statement of Latin-American needs, and of calling the attention of all international agencies or other bodies, who may be concerned, to these special needs of the Latin-American countries.

III. Finance

THE CONFERENCE,

RECOGNIZING that in certain cases the required capital outlay may be too great to be provided from national financial sources alone,

RECOMMENDS that, if economic development is to progress more rapidly during the next few years, a larger and better regulated flow of funds than is currently available should be promoted, preferably by and through international agencies working within the framework of the United Nations, principally the International Bank for Reconstruction and Development.

IV. Forest Output

THE CONFERENCE,

RECOGNIZING that the practices followed by some countries in the exploitation of their forests are primitive and thus detract from the quality of forest products, which consequently have a low commercial value,

RECOMMENDS that the Latin-American countries, which produce forest products and other commodities derived therefrom, improve their methods of exploitation, giving special attention to the quality of the finished product.

V. Forest Products Industries

THE CONFERENCE,

CONSIDERING that machinery at present in use in industrial centers has suffered considerable hard wear, while modernization is impossible due to the failure of supplies from countries producing machinery;

CONSIDERING also that a substantial increase in the quantities of wood available for local consumption, industrial conversion, and export involves, among other things, increased efficiency at all stages of production, including improved techniques in sawmills and other manufacturing plants;

RECOMMENDS that Latin-American countries should plan for their own forest industries by building new manufacturing plants and modernizing existing installations. Trade channels should be expanded in such a way as to make machinery and other requirements for forest industries available to Latin-American countries which are actual or potential producers and exporters of forest products, permitting a logical exchange of trade and a mutual betterment in countries' standards of living.

VI. Industrial Production

THE CONFERENCE,

RECOGNIZING that greater local industrial production facilities would reduce the dependence of various countries of Latin America on imports of manufactured or semimanufactured wood products, and expand their trade potential,

RECOMMENDS the desirability of producing a greater range of wood products and derivatives, such as plywood, fiber boards, pulp products, and secondary

manufactured products, and of providing facilities for the adequate drying and preservation of timber, both before and after conversion.

VII. Controlling the Cutting of Wood for Fuel

THE CONFERENCE,

CONSIDERING that, in order to avoid wasteful cutting of forests, particularly protection forests around centers of population and in mountainous regions, countries of Latin America should endeavor to regulate the cutting of wood for fuel and charcoal, basing this cutting on principles of sound forest management,

SUGGESTS the advisability of gradually substituting wood fuel and charcoal by mineral fuels and by encouraging a greater use of hydroelectric power, wherever this is economically justified.

VIII. Integration of Industries

THE CONFERENCE,

CONSIDERING that countries should give special attention in their forest development plans to the adaptation of modern logging and extraction methods to local conditions, so as to increase intensity of exploitation, decrease wastage, and lower costs;

CONSIDERING also that one of the best means of achieving increased forest and industrial output under the conditions prevailing in Latin America is through the proper integration of various industries using wood as a raw material, drawing on predetermined forest areas producing a maximum sustained yield;

RECOMMENDS that governments, with the assistance of FAO and its technical committees, examine in detail the possibilities for the creation of integrated forest industries in selected localities in Latin America and for the erection of pilot plants.

IX. Marketing of Forest Products

THE CONFERENCE,

CONSIDERING that ready and stable markets can only be found if the costs of cutting, extraction, transportation, and manufacture of timber are kept to the minimum compatible with quality standards of the products and with a fair remuneration to the worker, and that this consideration suggests the need for improved systems of forest exploitation as an essential prerequisite to marketing technically satisfactory products at prices attractive to potential buyers,

SUGGESTS that FAO should advise on suitable methods of carrying out preliminary studies towards achieving uniform practices for the marketing of timber and wood products.

X. International Trade[1]

THE CONFERENCE,

CONSIDERING that a greater expansion of foreign trade in timber will be difficult while international trade is hampered by the different systems of control in existence and by the high cost of land, river, and sea freight, whereas export of semifinished products would lessen shipping space requirements and considerably reduce freight costs;

CONSIDERING also that exports which at present consist chiefly of raw materials should rather in large part be made up of processed products, and further that it is essential that buying markets should endeavor to absorb manufactured or processed products as these become available, thus making this transition possible;

RECOMMENDS that FAO, in consultation with appropriate technical and economic agencies, make a study of all factors which would contribute to the easing of international trade in such products, with special reference to freight costs.

XI. Standardization of Forest Products

THE CONFERENCE,

CONSIDERING that increased international trade in forest products requires standard trade specifications, which would clearly denote the qualities and specifications of products,

URGES that FAO, in consultation with Latin-American governments, seek to introduce standard grades, specifications, and sizes for the different Latin-American forest products entering into international trade, in the interests of both producers and consumers.

XII. Publicity about Latin-American Forest Products

THE CONFERENCE,

CONSIDERING that publicity about Latin-American timbers and other forest products should be intensified in consumer countries, and that the merits of particular species should be widely publicized, since much of the difficulty encountered in marketing wood products and their derivatives is, in large part, due to interested countries lacking knowledge of their existence and quality,

RECOMMENDS that Latin-American governments make known, through intelligent publicity abroad, the excellent qualities of the forest products of the Americas, so as to attract attention to possibilities for increased trade.

XIII. Forest Products Research

THE CONFERENCE,

CONSIDERING that the expansion of markets and of forest products utilization calls for a great development of laboratory research, whose results need to be collated, co-ordinated, and made widely known,

RECOMMENDS (a) that all Latin-American governments make full use of existing national or international research facilities, calling, if necessary, upon FAO for assistance in this matter, and paying attention to the application, wherever appropriate, of existing knowledge in the field of research, (b) that a Latin-American Research Center for forest products be established, maintained by the respective governments, suitably endowed, and devoted to the special problems of the Latin-American countries,

[1]The United Kingdom delegate wishes to record his vote against this resolution, on the grounds (a) that the second consideration deals with questions of principle which can only be a matter for decision by individual countries, in the light of their economic policy, and (b) that FAO is not the proper agency to consider and advise on ways and means of overcoming the particular difficulties to which attention is drawn.

FAO should consult with the Pan American Union and interested governments as to the best location for this institute.

XIV. Labor

THE CONFERENCE

CALLS the attention of Latin-American governments to the importance of the following conditions for forest and timber industry workers:

(a) security of employment,
(b) establishment of fair wage rates,
(c) improvement of standards of living, especially as regards housing, hygiene, and nutrition,
(d) facilities for technical training.

XV. Forest Products Statistics

THE CONFERENCE,

RECOGNIZING the importance of all governments being constantly informed regarding production, consumption, and trade in forest products,

SUGGESTS to Latin-American governments that they should (a) ensure the compilation of relevant and comparable data, as instanced in the statistical program of FAO's Division of Forestry and Forest Products, and (b) furnish FAO with annual statistics on forest products. The minimum program should include data, covering the more important wood products, on annual output from the forest, industrial production, and foreign trade.

RECOMMENDS that FAO should send experts to Latin-American countries to advise and train statisticians, and to further direct contacts with the officials dealing with statistical problems arising from FAO's activities.

PROTECTION AND DEVELOPMENT OF FOREST RESOURCES

XVI. Forest Services

THE CONFERENCE
RECOMMENDS

(a) that all governments be urged to establish specialized technical Forest Services, either independent or attached to a ministry dealing with related services;
(b) that these services be on a scale proportionate to the tasks to be undertaken, the extent of forest resources, and the programs to be developed;
(c) that adequate funds be provided for the carrying out of their tasks in a proper manner;
(d) that, on request, FAO give technical advice in establishing services of this nature, at the expense of the governments concerned;
(e) that it is desirable also to establish close collaboration between the forest services of the Latin-American countries, to which end FAO shall give all necessary help and advice.

XVII. Forest Research

THE CONFERENCE
RECOMMENDS

(a) that all Latin-American nations be urged to draw up forest research programs, spread over the largest possible number of localities, and carried out under the supervision of the Forest Service of each country. The findings should eventually be referred to a central institute whence they can subsequently be given wide publicity;
(b) that FAO's Division of Forestry and Forest Products give due attention to the early development of the project relating to the Hylean Institute of the Amazon, sponsored by UNESCO, in view of the interest that this Institute might present in the carrying out of the previous recommendation. In any event, close co-operation with this Institute is necessary since it should be able to contribute substantially to forest research in the Amazon basin.

XVIII. Training of Personnel

THE CONFERENCE,

(1) *For immediate action*

RECOMMENDS

(a) that FAO make a census of educational centers for forestry, in which should be specified:
    (i) locality and environment in which work is carried out;
    (ii) program of studies;
    (iii) duration of courses;
(b) that FAO follow closely the distribution of scholarships given by universities, laboratories, and governments for training and postgraduate work of specialized technicians;
(c) that the different governments aid the establishment and expansion of forestry courses with the object of preparing:
    (i) graduate forester - agriculturists (Ingenieros agronomos-silvicultores) trained in agricultural or similar schools of university standard, with another year or more of specialization in forestry sciences;
    (ii) forestry experts graduated from vocational schools, to be put in charge of reforestation work, cutting and sawmilling and similar work in forest industries;
    (iii) forest wardens to be put in charge of forest watch, law enforcement, fire control, etc.;
    (iv) popular extension courses of short duration for forest owners, plantation workers, technical instruction to sawmill operators, etc.;
(d) that the practice of exchange of specialists among different countries and among the teachers and pupils of educational establishments be intensified. In cases where exchange is not possible, the sending of teachers of forestry from recognized universities with forestry courses is recommended.

(2) *As a program for later action*

RECOMMENDS

(a) the creation of forestry schools, of university standards, for turning out foresters capable of directing forestry operations, forest policy, administration, etc.;
(b) the implementation of the recommendation made by the Subcommittee on Unexploited Forests at its meeting in Geneva in August 1947, relating to

the creation of a Latin-American Forestry Institute, to carry out programs of basic research work and for postgraduate higher technical schooling;

(c) that FAO, in conjunction with the Pan American Union, should investigate the best possible location for this Institute, and to this end should consult with countries interested in this project.

XIX. Forest Inventories

THE CONFERENCE
RECOMMENDS

(a) that all Latin-American countries be strongly urged to prepare or complete their forest inventories;

(b) that these inventories should be developed gradually, starting with general objectives: for example, the delimitation of forest areas and of forest types and the listing of soils needing afforestation; and proceeding, as becomes necessary, to those objectives indispensable to rational forest management, such as density of stocking of forest species of economic value, their volume, rate of growth, etc.;

(c) that governments should fully recognize the importance of the World Agricultural Census of 1950 and the prominence which should be given in this Census to forests;

(d) that FAO should, as governments may request, facilitate co-operation among countries, or inform them about methods they should adopt, by means of:

(i) the publication of a pamphlet describing methods of preparing inventories, either as general surveys or for the detailed determination of factors essential to forest management, and the distribution with this pamphlet of a booklet on forestry terminology

(ii) dispatching to countries, on request and at their expense, and well ahead of the 1950 census, one or more technicians to advise governments on the organization or improvement of their statistical services, with a view to achieving uniformity in the preparation of inventories, particularly where forestry is concerned, thus ensuring the maximum accuracy in the results obtained.

XX. Forest Legislation

THE CONFERENCE
RECOMMENDS

(a) that the governments of those Latin-American nations which have no forest laws, pass legislation without delay for the protection and development of their forest resources;

(b) further, that nations which already have pertinent laws, introduce such amendments as may improve existing legislation;

(c) that FAO's Division of Forestry and Forest Products assist countries wishing to study or amend forest legislation:

(i) by the compilation, study, and comparison of existing legislation and by making known the results of these investigations to interested countries, so as to bring to their attention the basic principles on which sound legislation should be based, and to help them adapt these principles to their particular conditions;

(ii) by encouraging co-operation in this connection between all Latin-American countries with common problems; and

(iii) by sending experts on forest legislation to such countries as may request them at the expense of the respective governments.

XXI. Reforestation

THE CONFERENCE
RECOMMENDS

(a) that it be suggested to all Latin-American countries, who have not already done so, that they initiate reforestation plans; which should include a program of forest nurseries for the free distribution of plants; the necessary funds to carry out these plans should be obtained from national or private resources;

(b) that the results obtained in these reforestation plans be investigated, especially as regards the geographical, ecological, and economic conditions of the regions where they are being carried out; furthermore, that a continuous interchange of information be maintained among countries about the results obtained in the course of these investigations;

(c) that, where necessary, special regulations be introduced into the forestry code in favor of reforestation work;

(d) that the work be carried out, whenever necessary, in close collaboration with interested industrial organizations and also with municipalities;

(e) that FAO's Division of Forestry and Forest Products give its technical assistance in such matters to all countries which ask for it, the cost to be borne by the respective governments;

(f) that the Division also give particular attention to examining and promoting an international convention for the certification of seeds and forest plants.

XXII. Education of the Public

THE CONFERENCE
RECOMMENDS

(a) that it be suggested to the governments of all Latin-American countries that they should interest the press, radio, and moving picture industry in matters of forestry; help private organizations dedicated to the spread of forestry knowledge; take advantage of every opportunity for publicity and secure the collaboration of institutions able to exert a useful influence on public opinion;

(b) that it be suggested to governments that they should give particular attention to teaching basic ideas about nature protection in schools;

(c) that in Latin America, as throughout the whole world, FAO's Division of Forestry and Forest Products continue its efforts to spread sound for-

The Report of the Conference is adopted at the Final Plenary Session.

estry principles, thus lending weight to the individual activities of these countries;

(d) that FAO's Division of Forestry and Forest Products continue to work in close collaboration with UNESCO towards fostering elementary forestry instruction, by means of a program of fundamental education and by other educational methods. Furthermore, it is suggested that the Conference on Conservation of Renewable Natural Resources which will meet this year in Denver, Colorado, U.S.A., should attach due importance to the educational aspect.

FURTHER PROCEDURE

XXIII. Latin-American Forestry and Forest Products Working Group

THE CONFERENCE

RECOMMENDS to FAO that, in order to aid in the solution of the forestry problems of Latin America, the Division of Forestry and Forest Products set up a Latin-American Forestry and Forest Products Working Group, composed of technical officers of FAO.

XXIV. Latin-American Forestry and Forest Products Commission

THE CONFERENCE

RECOMMENDS

(a) that a Latin-American Forestry and Forest Products Commission be created, consisting of technical delegates of all Latin-American countries, which can meet at regular intervals to advise FAO's Forestry and Forest Products Working Group, and to ensure that its work be brought to the notice of, and be implemented by, the governments of the Latin-American countries;

(b) that this Latin-American Forestry and Forest Products Commission consider as its first objective the adoption by Latin-American governments of all measures needed to implement the recommendations of this conference;

URGES the governments of Latin America to enable their experts and specialists to assist FAO as members of this Commission and of any other technical bodies it may decide to call together.

XXV. Reviewing Plans and Progress

THE CONFERENCE

RECOMMENDS that, during the coming year and, if necessary, with the technical assistance of FAO's Division of Forestry and Forest Products, its regional working group for Latin America, and its technical committees, each interested government study and elaborate forest development plans, based on the principles laid down by this Conference and covering a given number of years,

FURTHER RECOMMENDS

(a) that these plans, as well as the results achieved in implementing the measures recommended by this Conference, be presented in 1950 at another Latin-American Forestry Conference to be called to gauge the progress made in the various countries;

(b) that FAO take all necessary steps, as far in advance of the Conference as possible, to determine its location.

XXVI. Provision of Foreign Talent

THE CONFERENCE

RECOMMENDS that FAO advise the competent agencies on practical measures for securing, for the Latin-American countries, the services of foreign technicians, qualified professionals and specialized workers, skilled in forestry, timber, and allied industries, from the ranks of Displaced Persons wishing to establish themselves permanently in these countries.

Delegates and Representatives

Attending the Conference

BRAZIL

Head Delegate:
DANIEL DE CARVALHO, Minister of Agriculture
Alternate:
VIRGILIO GUALBERTO, President of National Pine Institute
Members:
LUCIANO PEREIRA DA SILVA, Legal Adviser, President of Federal Council on Forestry
ANTONIO DA CUNHA BAYMA, Technical Assistant to the Minister of Agriculture
LINCOLN NERY DA FONSECA, Secretary-General of National Pine Institute
RAYMUNDO PIMENTEL GOMES, Director of Forest Service
OLIMPIO FLORES, Chief of Washington Agreement Commission, Ministry of Finance
JESUS SOARES PEREIRA, Chief of Division of Forest Economics of the National Pine Institute
Advisers:
SILVIO AZEVEDO LIMA, Chief of Division of Statistics of National Pine Institute
JOSE BENIGNO DE OLIVEIRA, Chief of Forestry Division of State of Minas Geraes
JOAO GERALDO KUHLMAN, Director of Botanical Gardens
DURVAL VIEIRA CALAZANS, Chief of Division of Classification of National Pine Institute
MANOEL V. GUSMAO FRAGA, Chief of Division of Reforestation of National Pine Institute
ARMANDO SAMPAIO NAVARRO, Director of Forest Service of Companhia Paulista de Estradas de Ferro
NELSON ALVES FONSECA, Ministry of Foreign Affairs
Secretary-General:
PAULO FERREIRA DE SOUZA, Vice-Director of Forest Services of Ministry of Agriculture

CHILE

Head Delegate:
RAUL GONZALES GUZMAN, Professor of Forestry, Temuco, Chile

CUBA

Head Delegate:
GABRIEL LANDA, Ambassador to Brazil, Cuban Embassy, Rio de Janeiro

DOMINICAN REPUBLIC

Head Delegate:
PEDRO PABLO CABRAL, First Secretary, Embassy of Dominican Republic, Rio de Janeiro

FRANCE

Head Delegate:
JEAN LARRIEU, Inspector-General of Waters and Forests
Member:
ANDRE AUBREVILLE, Inspector-General of Waters and Forests

GUATEMALA

Head Delegate:
FRANCISCO GUERRA Y MORALES, Minister of Guatemala in Brazil

HONDURAS

Head Delegate:
MANOEL SOTO DE PONTES CAMARA, Consul of Honduras, Rio de Janeiro

MEXICO

Head Delegate:
HECTOR LAZOS, Agricultural Attaché to the Mexican Embassy, Buenos Aires

NETHERLANDS

Head Delegate:
IZAAK ANTHONIE DE HULSTER, Chief or Forest Service, Surinam
Adviser:
JUSTUS WILHELM GONGGRYP, Professor, University of Delft

NICARAGUA

Head Delegate:
JOSE MERCEDES PALMA, Consul of Nicaragua, Rio de Janeiro

PARAGUAY

Head Delegate:
GILDO GUERRERO INSFRAN, Agronomist, Ministry of Economics

PERU

Head Delegate:
FELIPE LIVONI LARCO, Secretary of Peruvian Embassy, Rio de Janeiro

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Head Delegate:
WILLIAM ANTHONY SOWDEN, First Secretary (Commercial), British Embassy, Rio de Janeiro
Alternate:
JAMES ALEXANDER BURNS, Second Secretary (Commercial), British Embassy, Rio de Janeiro

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Member:
JOSEPH LEO MULLER, Chief, Forest Products Branch, Office of International Trade, Department of Commerce, Washington, D. C.
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ITALY

Representative:
ELISIO BALLERINI, Commercial Counsellor, Embassy of Italy, Rio de Janeiro

PORTUGAL

Representative:
JOSE ALVES, Forestry Engineer, Office of the Portuguese Government Forest Service

UNITED NATIONS

Representative:
PAUL VANORDEN SHAW, Director, United Nations Information Center, Rio de Janeiro

UNESCO

Representative:
PROF. BASILE MALAMOS, Field Science Co-operation Officer for Latin America
Associate:
FILHO LUIS EMYGDIO DE MELLO

INTERNATIONAL LABOUR ORGANISATION

Representative:
ALFONSO BANDEIRO DE MELLO, Head of Botany Department, Museo Nacional, Rio de Janeiro

PAN AMERICAN UNION

(See below)

INTER-AMERICAN INSTITUTE OF AGRICULTURAL SCIENCES

Representative:
RALPH HERBERT ALLEE, Director—Also representing Pan American Union
Associate:
MANUEL ELGUETA, Agronomist, Head of Plant Industry Department

Forest Resources of Latin America

THIS interim statement respecting the forest resources of Latin America covers the region extending southward from the United States-Mexico boundary to Cape Horn, including those islands of the Caribbean for which estimates are available. Here are to be found the largest reserves of unexploited forests remaining in the world.

Unfortunately, the state of our knowledge respecting the nature and extent of the forests of the region is unsatisfactory. In order to prepare the table appearing at the end of this page it was necessary to draw upon many sources of information which varied widely in completeness, accuracy, and data. The table does, however, give a preliminary basis for discussion.

Latin America comprises an area of nearly 2,100 million hectares and is inhabited by about 150 million people. Forests cover 40 percent of the total area of the region, or about 824 million hectares. There are, then, 5.5 hectares of forest per inhabitant.

It is estimated that about 10 percent of the total forest area is of too poor a quality to be classed as a future source of forest products other than fuel. Consequently, not more than 740 million hectares can be classed as "productive" forest. It is not yet possible to estimate, for the region as a whole, how much of the productive forest area can now be reached by commercial operations and how much should still be classed as inaccessible. Neither can we estimate, as yet, what proportion of the forests should be reserved for such purposes as the protection of watersheds.

Available information indicates that about 97 percent of the productive forest is composed of broad-leaved trees, 2 percent of pure coniferous (softwood) type, and 1 percent of mixedwood. Applying these

FOREST RESOURCES OF LATIN AMERICA
(Including islands of the Caribbean for which estimates are available)

Sources[1]	Country	Population	Total Area	Productive Forest: Broad-leaved	Productive Forest: Conifers	Productive Forest: Mixed-woods	Productive Forest: Total	Total Forest: Other Forest	Total Forest: Forested Area	Total Forest: Percentage of Total Area	Forest Area per caput
		(*Millions*)	(*Thousand hectares*)							(*Percentage*)	(*Hectares*)
1	Argentina	15.8	281,363	22,706	120	60	22,886	25,684	48,570	17.3	3.1
3 7	Bolivia	3.8	106,883						46,889	43 9	12.3
1	Brazil	46.7	851,119	368,420	8,750	0	377,170	18,758	395,928	46.5	8.5
1	British Guiana	0.4	20,926	13,986	0	0	13,986	4,144	18,130	86.6	45.3
1	British Honduras	0.06	2,297	1,539	40		1,579	532	2,111	91.9	35.2
1	Chile	5.4	74,177	6,303	379	0	6,682	9,541	16,223	21.9	3.0
1	Colombia	10.3	113,916	68,300	0	3,700	72,000	0	72,000	63.2	7.0
5	Costa Rica	0.8	4,982						3,885	78.0	4.9
1	Cuba	5.0	11,655	2,585			2,585	878	3,463	29.7	0.7
1	Dominican Republic	2.1	5,007	2,688	750				3,438	68.7	1.6
1	El Salvador	2.0	3,413	23	81	1,888	1,992	0	1,992	58.4	1.0
3	Ecuador	3.3	30,000				16,000	2,000	18,000	60.0	5.5
1	French Guiana	0.04	9,000	7,000	0	0	7,000	0	7,000	77.8	175.0
4	French West Indies	0.3	491						24	4.9	0.1
1	Guadeloupe	0.3	178	31	0	0	31	53	84	47.2	0.3
1	Guatemala	3.6	10,890	5,000	0	0	5,000	2,200	7,200	66.1	2.0
3 7	Haiti	3.5	2,643	500			500	150	650	24.6	0.2
3	Honduras	1.2	15,540						10,000	64.4	8.3
7	Jamaica	1.3	1,200						195	16.3	0.2
7	Leeward Islands	0.1	110						34	30.9	0.3
2 3 6	Mexico	22.8	196,937	23,856	2,000	0	25,856		25,856	13.1	1.1
7	Nicaragua	1.1	11,564						4,047	35.0	3.7
7	Panama	0.7	7,401						5,245	70.9	7.5
1	Panama Canal Zone	0.06	94	56	0	0	56	0	56	59.6	0.9
3 4	Paraguay	1.2	39,000						11,286	28 9	9.4
1	Peru	7.8	124,460	50,000	0	0	50,000	20,000	70,000	56.2	9.0
1	Puerto Rico	2.1	892	80	0	0	80	8	88	9.9	0.04
1	Surinam	0.2	15,527	10,500	0	0	10,500	0	10,500	67.6	52.5
1	Trinidad and Tobago	0.6	513	253	0	0	253	49	302	58.9	0.5
1	Uruguay	2.3	18,693	441	7	4	452	0	452	2.4	0.2
3	Venezuela	4.4	91,205						40,130	44.0	9.1
1	Virgin Islands	0.03	34	8	0	0	8	0	8	23.6	1.1
4	Windward Islands	0.3	213						21	9.9	0.1
	TOTAL	149.5	2,052,170						824,105	40.1	5.5

[1]SOURCES: 1. FAO Forest Inventory Questionnaire 1947. 2. Periodic Reports from Governments to FAO. 3. Informal reports to FAO. 4. International Institute of Agriculture Yearbooks. 5. U.S.D.A. Office of Foreign Agricultural Relations. 6. U.S.D.C. Industrial Reference Service. 7. Miscellaneous references.

percentages to the productive forest area, we arrive at the following distribution:

Forest type	Million hectares
Broadleaved	718
Conifers	15
Mixedwoods	7
Total	740

The broadleaved forests contain a very great variety of tree species, but only a few, such as the valuable mahogany and greenheart, enjoy established positions in world markets. Other species have found limited markets within Latin America itself, but there remain a great many tree species for which no markets exist and which cannot yet contribute anything to the prosperity of the countries in which they stand.

The physical difficulties of extracting and transporting logs from many of the broadleaved forests are great and the costs of production high. Costs are further increased when it is only possible to harvest two or three dozen trees of selected species from a square kilometer of forest.

Before the broadleaved forests of Latin America can make their full contribution to the wealth and well-being of their owners, much research must be undertaken to determine the qualities and uses of many tree species, and a great effort must be made to develop suitable markets for these "new" timbers.

The relative scarcity of coniferous (softwood) species is a striking feature of the forests of Latin America. This lack has important implications because the greatest demand on world markets is for coniferous wood. Furthermore, domestic demand for conifers is likely to increase sharply as industrialization develops within the region. There is only one-tenth of a hectare of natural coniferous forest per inhabitant, and roughly one-half of all the coniferous forests are concentrated in southern Brazil. However, some additional supplies of coniferous timber can be obtained from the limited area of mixedwoods.

It is evident that most of the population must always depend on broadleaved species for all their wood and that many new industries will have to adapt broadleaved species to their use or to rely perpetually on softwoods imported from abroad.

It is equally evident that all the softwoods that can be grown in Latin America will eventually be needed within the region. There may be a short period, while coniferous forests now idle are being opened up, when a limited surplus of coniferous timber may be available for export to other continents; but, as local markets develop, such exports are likely to become very small or to cease.

These estimates of forest areas do not include lands which formerly bore forests but are now barren. Many such areas exist and should be replanted as soon as possible, in order to protect the soil and to secure crops of timber from a resource that now lies idle. The planting of conifers, wherever conditions are suitable, is recommended as a means of relieving the shortage of coniferous timber.

More positive information respecting the extent, nature, and possibilities of the forests of Latin America is urgently needed. Only eight of the republics of the region have been able to reply to FAO's forest inventory questionnaire. Among these only one, Chile, possesses sufficient information to make possible an estimate of the relationship between current growth and current drain in the forests. In Chile it has been shown that forest devastation is proceeding at an alarming rate; but, now that the government knows the facts, it is in a position to undertake remedial measures.

Forest inventories are urgently needed in all countries, partly to establish new commercial possibilities and partly to determine whether or not the forests are being depleted.

Until recently, the difficulty of access to many of the forests of Latin America has made their examination both slow and expensive. Now, however, remarkable progress in perfecting the technique of aerial forest surveys has changed the situation, and it is hoped that many new inventory projects will be undertaken in the near future. This procedure has already been commenced in some countries, including Argentina and Venezuela.

The Forestry and Forest Products Division of FAO will be glad to secure competent technical advice on forest survey methods for countries which desire it. Furthermore, the Division is preparing a list of commercial air survey companies qualified to undertake aerial forest surveys and this list will be at the disposal of Member Governments.

Exploitation of Forest Resources

FULL use should be made of the forest resources of Latin America on a rational basis, each country acting in accordance with its possibilities. It is worth briefly outlining the general reasoning in favor of this view.

1. Firstly, an increase in output is called for, principally as a means of satisfying growing domestic demands but also as a contribution towards world wood supplies.
2. More intensive and better organized exploitation would permit reduced production costs, which should bring forest products within the reach of a greater number of potential consumers.
3. Large-scale planned exploitation of mixed tropical forests and a greater utilization of their products is the only economical means of introducing intensive silviculture and of altering growing stock, now without great value, into a permanently balanced forest of higher value. Carefully managed exploitation of pure or almost pure virgin stands, by draining off annual growth, not only derives reve-

nue from capital hitherto unproductive, but also improves the health of the growing stock.

4. Lastly, large-scale undertakings can only be based on intensive exploitation. Mechanization and industrialization economize in labor, which is often scarce and costly, and lead to improved working conditions and a rise in standard of living.

It must be clearly realized that it is no use stepping up production unless certain other conditions are fulfilled. Timber from the forest and products of industrial plants must be marketable. That is, they must satisfy the technical requirements of users and there must be definite markets to absorb them. Products must be able to reach manufacturing centers, a fact which implies a program of public works and the provision of means of transportation. Research determines whether a particular wood is usable in one way or another.

The commercial production of timber and wood products recognized as usable is not just a matter of organizing markets. Comparative costs of production are the determining factor. It is, in fact, essential that forest products should reach trade channels of distribution at prices which can compete successfully with commodities already well known and accepted and which are also within the means of a new class of consumer with limited purchasing power. All efforts must therefore be directed to reducing costs at various phases of exploitation, conversion, and transport, by improved methods and sound utilization, although not to such an extent as to preclude proper silvicultural management.

Forest Products Research

To know whether a wood is usable in one way or another, its properties must be perfectly understood. In theory, the elements of detailed research should be as follows:

First, as in all forestry matters, comes knowledge of the forest itself. There are two particular aspects to this study:

1. Knowledge of each of the principal species comprising the forest. This is a problem of botanical identification, particularly important in mixed growing stocks.
2. Understanding of the forest composition by quality and quantity, in particular the proportion of each of the principal species, so as to determine whether a particular wood which research has judged to be useful can be exploited and marketed in sufficient volume.

Second, the wood properties of each species must be evaluated, covering the following points:

(a) physical and mechanical properties,
(b) technical qualities, and
(c) chemical composition.

These two general lines of inquiry will establish a certain number of essential facts, mainly of theoretical importance. They must be supplemented by a third series of investigations covering industrial application, designed to disclose

(a) possible end-uses,
(b) working qualities for mechanical industries,
(c) use for chemical conversion, and
(d) possibilities and need for preservatives.

Research and testing can be classified more exactly along scientific lines into three broad categories:

1. Biological—including botanical and forestry research, wood anatomy, and preservation against insects and fungi;
2. Physical—including principally tests of physical, mechanical, technological, and working properties;
3. Chemical—comprising study of wood, various forest products, and important industrial and commercial products from the chemical point of view.

This brief outline of research requirements shows clearly the complexity of the work needed for each species. In temperate regions the number of species is relatively small and, more particularly in Europe, the different kinds of wood have been put to various uses since olden times. Since only a limited number of species have had to be dealt with and empirical knowledge has guided the way, it has been possible to carry out recent scientific research and testing fairly rapidly, yielding results of interest very quickly.

In Latin America the problem is much more complex. Forest types vary widely and the growing stock is in some cases very mixed. Today, only a few species are commercially recognized.

We cannot, under these circumstances, immediately undertake a complete study of all species. Even if means were available, it would still be necessary to restrict investigations to certain species only and, even for these, to the more urgently important aspects, such as:

(a) botanical identification, on which all other testing is dependent and which is most important commercially;
(b) density of air-dry wood, which can be used to provide an estimation of mechanical qualities;
(c) seasoning properties and immunity to attack by insects and fungi.

If large-scale extraction and industrial undertakings are to be encouraged, as they should be, initial developments must be based on species already recognized. Plans for further expansion will have to take account of results yet to be revealed through research.

How should forest products research be organized in Latin America?

1. The simplest and quickest method would appear to be to entrust the necessary work immediately to foreign institutes of established reputation, having the specialists and proper equipment required. The obvious advantages are the ease and speed with which the work could be carried out. The disadvantages are that this arrangement could only be provisional and individual forest services would have difficulty in orientating research in the right direction. Lastly, the results obtained would be incomplete. Only samples easily transportable and not perishable could be worked on by this method. Freight charges on bulky or heavy specimens would be very costly. Nor should it be forgotten that certain kinds of research have to be undertaken in the actual tropical environment where production, conversion, and utilization are to be carried out.
2. In a region as vast as Latin America, local conditions must vary greatly. Countries have different needs, interests, and plans, and their own peculiar problems. It might be wise to advocate the creation of proportionately sized research institutes in each country with major forest resources. The advantages will be shown later, but the considerable disadvantages of this course must be noted. Each

such establishment requires a staff of research specialists and technicians, and these need long training and are hard to find throughout the world. Costs of founding and running a complete institute may be too heavy for individual governments. Also, to take an extreme example, the subsequent division of work between neighboring countries might lead to competition which, though at first healthy, might later mean quite unnecessary duplication of effort and expenditure, completely out of proportion to the results obtained.

3. At the first meeting of FAO's Subcommittee on Unexploited Forests, delegates of different countries suggested the creation of a common forestry institute, including research laboratories and higher educational facilities, for the whole of Latin America. Such an institute could focus its program of research on problems directly touching the majority of countries, and could collect a sufficiency of personnel, equipment, and funds to undertake serious work. All the same, certain disadvantages already noted as relating to the first method still attach to the problem of the administrative organization of such an establishment. These include the necessity of working only with samples, the difficulty of studying problems peculiar to certain countries, and the impossibility of undertaking research in particular environments.
4. The following plan, if attacked boldly, should satisfy the double aim of combining the advantages of the above methods and of avoiding as far as possible their disadvantages.
   (a) First, the creation of a central forest research and training institute for all the countries of Latin America, limited in functions but serving as a documentation center and having laboratories and experiment stations capable of undertaking research, within the three broad categories given above, with transportable samples. The documentation center would collect, study, collate, and send out to the different countries all information, from local sources or from abroad, which has any bearing on Latin-American forestry or forest products. The laboratories would carry out research work requested by the different countries, in conformity with a general program laid down by a council comprising representatives of the governments participating in the work of the institute. Results obtained would be publicized in accordance with the decisions of this council.
   (b) Working in close harmony with this institute, each country having important forest resources should establish a subordinate local station, whose particular role would be to keep contact with the documentation center, to gather together and send off samples for study by the central institute, and to undertake research in particular environments and all other research of specific value to the government concerned.

It is obvious that such a project would take a considerable time to get properly started. In the meantime this period of planning and getting things started should not be wasted and interim aid in carrying out the basic work of inventorying should be requested from all countries with research facilities, along the lines suggested in the first method, while at the same time opportunities should be taken of building up laboratory personnel.

A project of this or a similar nature must be given effect if the countries of Latin America want to achieve an increasing and more intensive forest output. It will necessitate not only financial support by each government but valid international co-operation. FAO's Division of Forestry and Forest Products is at the service of member countries and can in particular help in collecting all relevant information concerning the setting-up of research services and the establishment of initial working programs. FAO can also serve as an intermediary for the exchange of information between all countries and the obtaining of indispensable technicians.

Organization of Exploitation of Forest Resources

The products of forest exploitation can be divided into three broad categories.

1. Timber and the principal commodities for which operations are primarily designed.
2. Incidental products of the system of silvicultural treatment in force. These have great importance in forests of mixed composition, and comprise, in general, secondary species, often unknown to commerce and up to now rarely put to use, especially in sparsely populated countries. For the most part they are not marketable without treatment or processing. Quite apart from any considerations of silviculture, management should always aim at making use of them so as to spread costs of harvesting over as great a volume as possible, since costs are likely to be prohibitive if borne by only the main crop.
3. Logging waste. This is mostly put to use in heavily populated countries where wood is scarce, but in undeveloped countries is often considered of insufficient value to warrant transport charges to consumption centers and is abandoned at site. Such waste material can be converted into assets by setting up local industries, located near extraction areas, where waste can be transported at low cost and can subsequently, in the form of finished or semifinished products, provide something to be credited against the over-all cost of exploitation.

In undeveloped countries, forest exploitation, to be economically feasible, must be intensive and aim at extracting the maximum amount of all three of the above categories of products, for silvicultural, economic, and social reasons.

In pure virgin forest, comprising pure stands or a limited mixture of species, there is an excess of overmature timber and one must initially take out a considerable volume so as eventually to obtain a maximum sustained yield. On the other hand, selection cutting in mixed tropical forests, instead of getting the growing stock into better shape, leads on the contrary to "creaming" and even to the complete elimination of the most valuable species and so to the impoverishment of the forest.

The vast scale on which exploitation of forest resources must be undertaken in these countries makes necessary a big program of public works and communications. It is obviously more economic that the considerable expenditure involved, added to the actual

costs of extraction, should be spread over as great a volume of output as possible.

Commercial considerations demand that one should at all costs avoid burdening the market with small stocks of a great variety of species. Stocks of each species should be adequate for making up commercial lots and should be regularly replenished in proportion to current demand. This is particularly important with new species in which the trade has taken the trouble to interest itself and which it desires to procure in regular shipments. All this is, of course, impossible except by intensive methods of exploitation.

Finally, unexploited forest tracts are often regions lightly populated. Small-scale extraction, often with poor equipment, tends to absorb an amount of labor disproportionate to the yields obtained. Large-scale operations, well planned and furnishing big returns, can on the contrary support mechanization, thus economizing in manpower and permitting reasonable conditions of work for labor. This scale of project alone can reap all the social and economic advantages of mechanization.

In conclusion, one may add that modern forest extraction operations must, directly or indirectly, be closely integrated with dependent industries. Feeding an industry always requires large quantities of raw material. As we shall see later, various industries must themselves be integrated so as to ensure to the utmost an economical utilization of all the products of the forest.

How should exploitation in Latin America be organized so as to attain these results?

1. Above all, too great a dispersion of effort must be avoided and a general survey of all forested areas must determine which are the ones most worthwhile exploiting from the economic viewpoint. Such a survey may be too wide in scope for individual countries to carry out and should be a co-operative endeavor, so as to ensure the best concentration of effort. In this way, a certain number of natural regions may be determined, offering the best conditions for forest exploitation. Choice of regions should be based on the following considerations:
   (a) The existence of extensive forest tracts, easily accessible. Determination of the relative value of the growing stock should take into account commercial requirements and existing knowledge in the realm of research.
   (b) The tracts should be served by a considerable network of extraction routes, either natural or capable of being easily developed, so as to reduce the amount of public works necessary. They should be located near enough to the main centers of local consumption and not too far from outlets for exportable products.
   (c) The presence of a sufficient population to provide the minimum manpower required, bearing in mind mechanization. Failing this, the region should be capable of affording reasonable conditions (climate, food, and accommodation) for planned immigration.
2. When a natural region has been selected which fulfills to the greatest extent the conditions laid down and which will serve as an important productive area, undertakings within the area must be carefully planned.
   (a) First, a detailed plan of operations must be drawn up, including the actual distribution of undertakings on the ground, in relation to the location of resources and the possible natural or artificial extraction routes. The program of industrialization must be closely tied in with this plan.
   (b) On the basis of this plan, a minimum of public works must be started at once.
   (c) Subsequently, a choice of extraction agencies, either public or private, must be made and the initial stages of exploitation set in motion.
   (d) General rules and regulations covering exploitation must be laid down for each natural region, in keeping with the provisions of forest law and fixing conditions which will fit in with the silvicultural system of management to be imposed and which will provide for a continuous minimum output sufficient to pay off the capital invested, whatever may be the economic circumstances of the moment.
   (e) Finally, provision must be made for co-ordination of all extraction operations. Profitable competition between enterprises may certainly be allowed to play its part but unnecessary competition between the requirements of local industries and export demands should be eliminated. Output therefore must be controlled so as to ensure a fair distribution between competing consumers. At the same time it is a good thing to encourage co-operation between businesses, say in the field of purchase of raw materials (group purchases), in maintenance of equipment (co-operative workshops and depots), and in the management of undertakings of common interest (transportation services, public works, etc.).
3. Once each extraction scheme has fallen into place within the over-all coherent plan, initiative must rest chiefly with the directors of the various operations. Public authorities have still a role to play in lending assistance and in exercising control. Help can take the form, for instance, of guaranteeing recruitment of labor; of according facilities for the acquisition of equipment; even, in case of necessity, of providing financial backing. Control should not take the form of negative interference. Rather the aim should always be to improve production. Each enterprise must be required to draw up an exact plan of exploitation, in conformity with the general rules and regulations laid down, and forest services should closely superintend the carrying out of its provisions.

If exploitation is well planned, and if expanding forest output is matched by a considered schedule of equipment and industrialization, the resulting production should be assured of being placed on the market.

Establishing Wood Industries

The importance of industrialization is self-evident: In most cases, it is a prime requisite of a rational exploitation of the forest resources of an undeveloped country.

Necessity and Importance of Industrialization

In considering the planning of exploitation, we have seen that it is not only necessary to extract and use

the principal timbers, but also the incidental products of the silvicultural methods of treatment and the waste resulting from harvesting the main crop.

In countries where resources are limited or the population is heavy, practically the whole forest output can find a sale in the form of roundwood or after crude conversion by local woodworkers. In undeveloped and sparsely populated countries, on the other hand, if the poorer quality materials are to help towards the high costs of development, they must be converted into products of value, in the form of finished or semifinished commodities.

The cost of handling very big logs generally precludes transportation over long distances. Apart from this, these big logs are used in industries where the value of the finished product is low in proportion to the cost of the raw material. They should not, therefore, involve any unnecessary expenditure and should be converted as close as possible to extraction routes.

All industrial conversion offers the advantage that it increases values while at the same time it decreases the volume or weight of products by the elimination of manufacturing waste. The resulting economy in costs of transport, though relatively little for certain commodities, is very considerable for others. Sawing permits a 50 percent reduction of the volume of the rough log, and chemical conversion even more. A product which must bear costly transportation charges for long-distance hauls is therefore better converted at source, so that subsequent expenses can be spread over manufactured commodities of greater market value.

Certain species, in particular softwoods and woods rich in starch, are quickly attacked after felling by insects and fungi and are rapidly rendered unusable, especially in tropical environments. It is difficult and expensive to treat them with preservatives in the log stage. They can only be rendered immune if they are treated after being cut up or if cutting and treatment are done immediately after extraction. These kinds of timber can therefore only be dealt with by setting up local industries. They must otherwise be abandoned at site.

We have given here the principal reasons why industrialization is a necessary adjunct of forest exploitation. Other beneficial consequences may be briefly noted.

The social advantages are obvious. A certain number of prime commodities can be offered at low prices to local consumers, whose well-being and standard of living is thereby affected. Forest industries provide work for the population, while mechanization at all stages makes this work congenial and leads to more technical opportunities of a higher grade.

From the economic point of view, if wood products destined for export can be increased in value through prior industrial conversion, trade balances will be improved and countries will be enabled to acquire greater amounts of foreign exchange for other commercial activities, a point of some import under present conditions.

To a certain extent, trade with other countries in manufactured wood products is always easier to arrange than trade in raw materials. Certain species, new to commerce and little known, may not be acceptable as rough logs to countries whose industries are not equipped or adapted to work them. Where special manufacturing methods are called for, special industries should be located near sources of supply rather than be spread all over the world.

Industrial Programs—Integration of Industries

There is one main fundamental principle. We must strive towards the most complete forest utilization possible. With this end in view, we can divide timber and its by-products into three broad categories: rough products destined for export, raw material for primary mechanical industries, and raw material for chemical and semichemical industries. Timber in the round should only go for export when it is of sufficient value in the rough to bear the whole cost of marketing.

Mechanical conversion industries (saw mills, plywood plants, etc.) have the advantage of being simple. Techniques are in general straightforward. Costs of installation and working are relatively small and only a reasonable number of engineers and technicians are demanded. There is the drawback, however, that they are exacting in the quality of raw material required.

Chemical industries are much more complex. Installation is expensive, many specialists are required, markets fluctuate and are difficult to forecast, and techniques are still being evolved. There are, however, two instances where they may be important—when they can produce commodities in short supply on domestic or world markets and when they can enable full use to be made of all the species which go to make up the average tropical forest. This last is impossible of achievement with purely mechanical industries.

A program of industrialization should be based on:

1. Material factors (value and composition of the forest, capital, and technicians available), technological knowledge, and technical possibilities.
2. Current demand or, where a demand is still to be created, the financial prospects which will vary according to the species concerned.

The mixed composition of certain forests, the necessity of getting the maximum out of them, and the limitations of individual types of plants, all demand a planned integration of industries of various kinds for each natural region so that all the products of the forest may be utilized to the greatest advantage.

Is it possible to devise and set in motion in Latin America so detailed and comprehensive a plan of industrialization and equipment?

Techniques in certain industries are not readily applicable to Latin-American conditions, especially in the matter of the treatment and manufacturing processes needed for little-known tropical woods. The commercial possibilities of certain finished products or by-products are still not established. It would be better, therefore, as a first step, to restrict action to setting up a maximum of the least complex and most remunerative industries. The installation costs of these industries can be quickly paid off, a factor which will further developments at a later stage. At first it will be necessary to leave certain categories of secondary timbers and logging waste rather than seek to put them to use by imperfect methods. The best course would be to concentrate on the setting-up of pilot plants for perfecting techniques, working out the right provision of raw material, experimenting on routine functioning, and determining the correct end-uses of the products. After all these preliminaries have been determined, the second phase will be the execution of the complete plan of industrialization.

Such industrialization projects, even if carried out

only on a small scale, will necessitate vigorous action. Apart from the research involved, considerable capital investment and a supply of technicians will particularly have to be looked for.

The nations of Latin America will, to a large degree, need to call on international organizations and on certain foreign countries for assistance. The interest of the latter, whose aid is essential, can obviously not be aroused except on the basis of carefully planned and coherent programs.

Production and Marketing of New Wood Species

NEW wood species, that is, woods not now used commercially, fall into two categories: those which are growing in regions which are already being extensively exploited; and those in regions which have not been exploited or which have merely been selectively logged for certain species usually of high value such as cedar, mahogany, teak, and greenheart.

The nonutilization of the first group of species in forests already subject to logging operations is usually found to be due to such factors as relatively bad form of trees; smaller size; and the presence of defects causing degrade, unsatisfactory service, or other results which make conversion or use relatively uneconomic. However, as stands of virgin timber of favored species become depleted, formerly unwanted species often take on new value. On the west coast of North America, hemlock formerly was regarded as an inferior species, as trees were smaller and more defective than those of douglas fir, and the moisture content of the wood was considerably higher. These factors militated against its utilization except as a secondary species. Now, however, all classes of sawn lumber are produced from hemlock, it has been covered by commercial specifications for lumber and plywood and without question has become a very important source of wood products.

Factors Contributing to Acceptance

What factors have contributed to the comparatively recent acceptance of hemlock in American and international lumber markets? In large measure it is due to the development of methods of conversion, processing, and marketing which are properly adapted to the particular qualities of this wood. Extraction of hemlock logs from the forest is integrated with logging for Douglas fir and spruce for sawmills, veneer mills, and pulp mills. Consequently, the roads and other extraction facilities are utilized to the maximum, resulting in a minimum cost per unit for logging of all species for all products. This is good from the points of view of both economy and forestry. Before conversion, logs are graded according to size and quality, provision being made for the sale of peeler logs and their utilization for plywood, and pulpwood is directed to pulp mills.

In the sawmills, logs are converted into lumber, being cut into sizes and graded in accordance with the grading rules which apply to this species in the United States of America and Canada respectively. As a result, hemlock lumber is marketed in a uniform condition as to size, grade, and moisture content, all of which factors, together with the regular availability of large supplies, have appeal to the buyer in normal times as much as in periods of short supply.

Advertising literature which makes rational and not extravagant claims for the properties and uses for which the species may be employed is also valuable in furthering acceptance in local and world markets. Other countries have had similar experiences in successfully establishing the value of woods formerly regarded as worthless.

Problems of Obtaining Acceptance

Utilization of woods from relatively unexploited regions in the tropics in South America, Southeast Asia, and Africa, which constitute the second class, has been freely discussed as a means of building up the standard of living and industrialization of tropical countries and assisting in reducing the current shortage of lumber in the world.

In these regions, despite the natural occurrence of large volumes of standing timber, the consumption per caput of lumber, paper, and other manufactured forest products is low and, furthermore, in some tropical countries, a large percentage of these products is imported from other regions. The following are important reasons why this situation exists:

1. World consumption of lumber for construction and packaging traditionally demands coniferous woods, whereas tropical forests are largely composed of broadleaved trees.
2. With limited exceptions, tropical forests are composed of literally hundreds of different species. The identification of many of these has not been clearly established on either a national or international basis. As a result, many different woods are called by the same name and the same wood may be known by several distinct names in different localities. This uncertainty of identification and the confusion of nomenclature, especially when unknown woods are described as varieties of cedar

and mahogany, etc., sometimes with intent to deceive potential buyers by making them believe that the wood has similar properties and will be good for the same purposes, is very misleading and has led to widespread distrust of new woods.

3. Climatic conditions are conducive to the rapid onset of decay of logs before conversion into lumber and drying are completed, and insect damage is prevalent both before and after conversion into lumber.
4. Exploitation in such areas is generally highly selective, being limited to a few species which, over a long period, have been found to give satisfactory service. Most of these species command high prices and are used for special purposes, as furniture, veneers, and panelling, especially on export markets.
5. Many trees of other species often of good size and form are not logged because they are not acceptable for lumber, as manufacturing techniques have not been adapted to their peculiar woodworking characteristics and other wood-using industries have not been developed.
6. Cost of extraction and transportation is usually high as a direct result of the factors mentioned in paragraphs 4 and 5 and because roads and railways are not available. Further, as freshly felled logs of many tropical species are heavier than water, floating and rafting cannot be applied even where suitable waterways are available.
7. There is little or no integration of industries using logs as basic raw materials.

Importance of Reducing Costs

The basic requirement for effective marketing is availability of a technically satisfactory product at a price which attracts potential buyers. Logging, transport, and manufacturing methods must, therefore, be such as to result in minimum costs commensurate with the quality of the product. To this end, attention should be given to the advantages of integration of various phases of mechanical and chemical utilization in local conversion and to the possibility of sale of logs for export, so that the most economic exploitation, according to quality and suitability for various purposes, and the maximum economic utilization from each unit of forest area will be possible.

Governments and private enterprises contemplating development of forest industries in tropical forests will, of course, give ample consideration to the future as well as the present. Operations should be established on a sound basis, primarily to meet normal demands at home and perhaps also some export capacity in selected items. Any tropical country which becomes self-sufficient in forest products indirectly helps importing countries throughout the world.

Lumber Production and Marketing

The largest proportion of lumber is normally required for construction and packaging, such material commanding lower prices than lumber for furniture and other specialized purposes. The limited market at high prices for these uses is, however, quite stringent in its demands. For successful exploitation to be built up in tropical areas, which are predominantly broadleaved, it will be necessary to depart from the world-wide custom of using coniferous woods for construction and packaging. It will be wise also to consider exporting high-grade material at good prices where local demand for such products is relatively small. Situations are envisaged in tropical regions where it may actually be cheaper to import softwood than to produce hardwood from native resources, unless a satisfactory export market can be found for high-priced products at the same time. Economic conditions and exchange problems may be important factors in determining the extent of local production.

It is obvious from the above that successful utilization of a wide range of woods from an unexploited tropical forest region, or one which has already been selectively logged for species of high value, is no easy task. In the first place, there may be no machinery available for conversion of logs into lumber, veneer, fiberboard, or other manufactured products, or, if available, this machinery may not be the most suitable for economic conversion, because it is inefficient, is erected in an unsuitable locality, or for some other reason.

Confusion in Nomenclature

The confusion which exists in the nomenclature of trees and woods of tropical forests constitutes one of the greatest problems associated with attempts to introduce new tropical woods to the world's market. Equally important is the problem of identification of trees, logs, and wood from tropical forests, as to the inexperienced eye many trees have similar form and appearance, and repeat orders for logs or lumber from tropical regions have frequently been filled with woods quite different from the original consignment.

Grouping of Species

There is a growing trend towards accepting for certain uses parcels of timber which are comprised of several species whose properties are generally similar and suitable for those uses. Encouragement of this trend along rational lines will greatly assist the development of utilization of tropical forests. An example of the type of grouping is that adopted during the war in Australia, where lists of woods suitable for various purposes, including building frames, furniture, flooring, boxes, cases, and other general purposes, were widely employed. For different parts of Australia, lists of suitable woods readily available were tabulated for the various uses.

As most species were produced within the geographic region for which the lists were prepared, only two or three species were included for many uses in western Australia, whereas in North Queensland 20 or 30 species from tropical jungle regions were suggested. It is interesting to note that the British Empire Forestry Conference held in England last year has urged the extension of the principle of grouping, for marketing purposes, of woods suitable for similar uses.

In areas where such grouping is not acceptable and for export markets, especially where woods are required for specialized purposes, it is desirable for producers and/or merchants to realize that buyers and consumers of lumber have largely been accustomed to purchasing the particular grade and species they desire and are reluctant to change.

To meet such demands it will be necessary, there-

fore, for producers and merchants to organize co-operative groups for marketing woods produced in limited quantities at a number of sawmills. Such a co-ordinated effort will help to satisfy buyers' demands that regular supplies of reasonable volume should be available.

Phases of Investigation

It is difficult to decide the most logical order in which investigations should be made to determine the potential production problems to be overcome. It is therefore proposed to deal with various stages in conversion from the standing tree to the manufactured product.

Felling

While it will be logical to follow the simplest method of felling with axes and saws, it may, as the result of experience, be found desirable first to ringbark or sapring some species, as is practiced with teak some time in advance of actual felling. The economics of using mechanical saws and other modern equipment should be investigated. As a means of reducing insect damage and blue stain, ringbarking at the crown some time before felling may be found desirable in some species. The use of chemicals in conjunction with ringing operations may be advantageous in facilitating removal of bark or preventing of insect attack.

Logging

It is a good rule immediately after felling to remove logs from the stump for conversion or for storage in a place conveniently near the converting plant. Exceptions arise, such as the effect of weather conditions, excessive rain making roads and tracks impassable, and the desirability of leaving the logs to lie in the forest to permit resorption of starch as a means of preventing subsequent attack by *Lyctus* and other insects whose chief food is starch in wood. If logs are to be stored, total immersion in water is best, but successful storage in dumps over which water sprays are operating has been demonstrated in Victoria, Australia, where logs from trees killed by forest fires in 1939 have scarcely deteriorated through eight years. The question of whether or not bark should be removed from logs which will be in the forest for some time is a debatable one. It can only be determined by experience with the particular species and in any particular area. Susceptibility to attack by pinhole borers is reduced or enhanced according as logs are barked in some instances and vice versa. If logs cannot be extracted and converted immediately after felling, consideration might be given to the benefits of coating the log surface with suitable insect repellents and with retardants to staining or decay organisms. End-coating to reduce or prevent deterioration of the ends will certainly be beneficial.

The use of powerful caterpillar tractors and other mechanical devices for logging makes possible the extraction of full lengths of tree trunks in many areas. This extraction is especially advantageous if a range of products is being manufactured, as it contributes towards the maximum utilization of standing trees. Disadvantages from a forestry management point of view are that full-length logging frequently results in damage to young standing timber and destruction of regeneration.

For large-scale operations it is probable that mechanical equipment will be most economical. However the feasibility of using water transport or some more primitive transport method which might prove more economical for a particular phase of extraction should not be overlooked.

Log Grading

Logs should be graded according to quality and size to ensure their best utilization and the best recovery from each, on the basis of either the variety of integrated industries to be supplied from the forest or the availability of an export market for special types of logs. The best quality logs should be allocated for peeling into veneers, the next quality for sawmilling, and lower grades for some phase of chemical utilization for paper, fiberboard, etc., or for sleepers, mine timber, destructive distillation, charcoal, or fuel. Special attention might be given to the preparation of flitches from stumps, crotches, burls, or figured logs which will command high prices for veneer manufacture.

Lumber Manufacture

In tropical forests it is generally best to convert logs as soon as possible after they are felled. While a large variety of sawmill equipment may be used to produce lumber, the important factors, apart from the economy of the manufacturing operations, are the production of lumber in standard sizes which are acceptable to local consumers and in export markets. Similarly, attention must be given to the proper grading of lumber produced and to offering it for sale in grades and sizes which, if other properties are satisfactory, will command a market at home or abroad.

Lumber Grading

Grading of lumber in accordance with reasonable grading rules, which take cognizance of requirements of the consumers and the capacity of producers to manufacture from logs obtainable, and regular supply of material graded to specification are essential steps for successful marketing. Satisfactory specifications covering finish grades for special purposes such as furniture, panelling, and flooring, and utility grades for general building, packaging, and other purposes not so specific in their requirements, should be set up and complied with. Such grading requirements are neither easy to establish nor maintain without experience. However, without a reasonable aim in this direction production and marketing will be unstable. International co-operation in the establishment of grading rules for forest products from countries with similar forests has promise as a further method of promoting marketing of new woods.

Seasoning

One of the most important manufacturing phases to ensure that lumber will behave satisfactorily in service is to dry it to prevent stain, decay, shrinkage, or warping. Unless green lumber cut from some woods is dried immediately, it may have to be dipped in antiseptic solutions to prevent reduction in quality through the growth of staining organisms. Adequate attention must be given to the establishment of suitable air-drying yards and/or kiln-drying plants so that lumber may be satisfactorily seasoned at the lowest cost and with a minimum of degrade.

Preservation

One of the greatest problems of the use of wood in the tropics is the prevalence of termites and other wood-destroying insects and of climatic conditions conducive to decay. Investigation of the durability of various woods and their potential uses will provide a guide to the establishment of preservation plants, to the best types of treatment and preservatives, and to the number and location of the plants.

Organization of Marketing

The development of production which is being advocated has two principal aims:

1. Increasing supplies for expanding local markets.
2. Providing exports to countries which require wood imports.

Organization of marketing must be directed towards these goals. A basic general requirement is that by intelligent publicity new woods of Latin America must be made known and appreciated. Such publicity should be based on results of research and the understanding of requirements.

Conditions for marketing will vary for different products. Distribution and sales of logs for common and certain specialized uses and of primary finished products which must be sold as cheaply as possible should be organized, so that unnecessary transactions and transport are avoided and movement from centers of production to conversion plants or centers of consumption will be as direct as possible. This problem is, then, one of organizing distribution in domestic markets of Latin America.

For the more valuable products, precious woods in the round, certain finished products and, generally speaking, for all products destined for overseas trade, the selling market must be organized especially in the large ports to which the majority of the production will be transported. These must be well serviced with personnel (special wood-exporting agencies, experts, and brokers), equipment (storage sheds, yards, and handling facilities), facilities for moving timber (railroads, roads, and waterways) and shipping facilities (ships, loading equipment, etc.).

If efforts are to be rewarded with success, the development of industries involving the use of new woods as raw material requires certain basic information concerning their properties and qualities, the application of sound technical methods to manufacture, the training of personnel in production and merchandising phases, and finally, the practical employment of these woods for purposes for which they are technically suitable.

Integration of Forest Industries

THERE has too often been a tendency to regard the forests of underdeveloped countries as "mines" to be exploited without thought of replacement or regard for the results of their disappearance. Moreover, extraction has been limited to the kind or size of timber or other product worth taking out under the economic conditions of the moment.

More developed countries have long been forced by scarcity of wood to look on forests from a different point of view. But, even so, utilization has rarely been carried to its ultimate degree.

The wood shortage is now world-wide and may become more acute as the result of expanding economies which will necessarily give rise to even greater wood demands. On the other hand, advances in modern techniques permit a higher ratio of finished products to be obtained from the raw materials of the forest and also provide means of using much of the logging and manufacturing waste, which was formerly a dead loss.

A tendency toward complete wood utilization is now becoming apparent in certain European countries and the idea is being looked upon with increasing favor in North America. It implies setting up groups of complementary wood-conversion industries, conveniently situated near the source of raw material.

This idea can logically be carried further. Tracts of wood-growing country can be set aside and managed on a sustained-yield basis over a virtually unlimited period, so that every year they can feed a certain optimum grouping of industries with determined quantities and kinds of wood products. This might be called "timber-farming" and the wood-growing tracts "forest farms." The volume of the crop, as also the quality, could be modified from time to time according to the technical requirements of industries and trends in world economic conditions. On a well-balanced "farm," there should be little or no waste.

This idea is not altogether in the realm of fantasy. It is not unreasonable to assume that it will in the future win out everywhere against the concept of crude exploitation. All world-wide problems of wood utilization can be considered from this point of view.

Distribution of "Forest Farms"

It has been said that the most effective way to encourage the growing of trees is to develop profitable reasons for cutting them down. The composition of the optimum grouping of forest industries will vary for different parts of the world. It must depend on the potentialities for production and consumption, which may be assessed by a study of current and future trends. Ultimately the most suitable distribution and location of "forest farms" throughout all the regions of the world might be determined.

Ideally, the industrial layout should include plants for mechanical and chemical conversion, sawmills and

plywood factories, fiberboard and similar plants, pulp and paper plants, resin plants, plastic plants, wood hydrolysis installations, plants for distillation and tanning agents. In practice, of course, local factors will determine what plants will suffice for utilizing the forest crop available. Industries need not necessarily all be located in one place but may be dispersed, so as to permit the best use of transportation facilities and the best distribution of raw materials.

It is obvious that in many regions suitably located installations of the kind required must already exist. A theoretical plan of development, however, will reveal any gaps that may exist and indicate what remains to be done. In less advanced regions, a blueprint of the optimum integration of industries must form the backbone of developments to be undertaken.

Side by side with the setting up of industries, transportation facilities, power plants, machinery, and chemicals will be needed to permit each "forest farm" to operate with reasonable economy. From the sum of these requirements it is possible, for a given region, to deduce the over-all capital investment required.

Optimum Size of "Forest Farms"

Knowing how many plants of each kind are desirable, it will be possible to define what might be the extent and limits of the "forest farm." An immediate tendency might be to make the "farm" co-extensive with a geographic region having a natural outlet for the whole area; for instance, a river basin. But, in certain easily accessible regions, well served by communications, the question of a natural outlet and of natural boundaries would assume less importance, and the area of forested land capable of sustaining the grouping of industries would be determined by research and inventories.

National frontiers will, of course, have a bearing on the size of "forest farms." Development of timber resources may also be only one element amongst many inter-related factors, such as increased agricultural development. Circumstances, therefore, will determine different solutions as to the nature and size of a "forest farm."

Silvicultural Problems

Timber has to be grown before it can be turned to practical use. Each "forest farm" therefore will pose problems of silviculture, the solution of which will have a direct bearing on the success of the enterprise.

The first consideration is to preserve the productive forest capital. The second is to produce the maximum quantity of all the kinds of wood that the dependent industries can fully use.

The fulfillment of these two conditions calls for the adaptation of silvicultural methods to the demands of the dependent industries, or the adaptation of industrial methods to the produce furnished by the forest, or for a compromise between the two.

There is a large field here for co-operation between the forester and the manufacturer, a co-operation too often neglected in the past, to the detriment of the interests of both.

Personnel

A survey is required of the total labor force necessary for the permanent working of each "forest farm" and its dependent industries, including forest workers, transport workers, and industrial manpower. In underdeveloped countries, new settlers may be required and they must be assured stable living conditions, with at least a minimum of amenities. Such a survey might assist countries in determining problems of new settlement and immigration.

An adequate supply of engineers, foresters, chemists, and other technicians is also needed, and the numbers required can be determined by detailed studies. For certain countries, this might justify the drawing up of educational and training programs, which in actual practice are seldom framed for specific requirements.

Conclusion

Plans as ambitious as this are obviously long-term projects. The idea, however, seems to provide the most logical means yet devised of assuring a rational management of the world's forests and a rational utilization of their produce, so as to secure to all peoples reasonable supplies of timber and other wood commodities.

The work of FAO already covers a wide field of action. This plan might serve as the co-ordinating link between the work of FAO and its affiliated bodies, the regional Commissions for Forestry and Forest Products, and among member countries themselves.

For instance, FAO's Technical Committee on Wood Chemistry might be prepared to advise on an ideal layout of chemical industries for a given region, taking account of the constant advances in this branch of utilization. It might advise on the location of industries and suggest market openings. It might also draw attention to the research needed to improve production.

The Technical Committee on Mechanical Wood Technology might be prepared to offer similar advice and suggestions in its own field. The Technical Committee on Forest Management could suggest ways of correlating silvicultural methods with the requirements of industries. The Technical Committee on Education might advise on the evaluation of technical personnel needed for the management of a "forest farm" and the utilization of its produce in a given region. All these Technical Committees can obtain the assistance of many experts from all parts of the world and their advice would carry great weight.

The Standing Advisory Committee could advise FAO on how to digest all the information gathered and the most suitable form for transmitting it to interested countries. It is of course up to countries themselves, having all the facts at their disposal, to define their own "forest farms."

The idea of "forest farms" should be expressed in national forest policies. Regional forest policies should evolve in the same way. Regional Commissions for Forestry and Forest Products, on the pattern of the European Commission, would have an important part to play, in facilitating exchanges of views and securing close co-operation with neighboring countries.

The ultimate co-ordination, on a world scale, of the various aspects of the integration of forests and industries would fall perhaps to the permanent Council of FAO and the annual Conferences of FAO. Here, indeed, is an opportunity for a planned approach to a practical project.

Organization of Forest Services

1. Role of Forest Services and Their Present State in Latin America

A FOREST service may be defined as a body whose function it is to conserve, to transform, or to create the forest domains necessary to a country, so that the inhabitants can be assured in the greatest measure the utilities of every kind which forests are capable of providing.

It is not necessary to enlarge on the importance of this role, which derives from the importance of the forest itself. It is sufficient to recall that forest utilities are of two sorts. The one sort is tangible, in the shape of forest products, principally timber. The other cannot be expressed in terms of money. It comprises the public utilities derived from the acknowledged influence of forest lands on climate, soil protection, and regulation of water flow. All of these add to the wealth of a country and some may be necessary to its survival. A forest service has three-fold attributes: research, administration, and policing. No one of these should fall within the competence of any other organization.

Such a service is indispensable for acquiring the intimate knowledge necessary for a forest's administration, beginning with the extent of the forested land, its effect on the physical economy of the country, and its composition. But that alone is not enough. The forest is a complex association, with closely interdependent elements. Man's interference, in taking out the riches of the forest, upsets this delicate equilibrium. It may cause the disappearance of the more valuable species, a complete change in the composition of the growing-stock, and even the utter ruin of the forest. In order to keep man's intervention within reasonable bounds, and even turn it to advantage by reconstituting and improving the forest, it is necessary to understand the natural laws which determine this equilibrium. These depend on varying conditions of soil, climate, and elevation, and on the diversity of species in tropical forests. Their study is a long-term proposition involving steady and complex research, which can only be carried out by specialists.

Forest administration must be built upon the findings of research, surveys, and forest inventories. It should therefore be in charge of the same personnel, or at least of those in the same service.

The administrative functions of a forest service are not solely concerned with getting the most products out of the forest. They must particularly include protection against the numerous forest hazards, especially fire. There is also the task of building up new forests, to ensure the perpetuation of timber resources or to put into use the poorest soils, and the job of remedying the ills of every kind which are a natural consequence of forest denudation. The pressing needs for reforestation make it clear that a forest service can be of undoubted use, even in the most poorly forested countries.

Forest administration cannot be practiced without forest laws to guard against abuse by man and to guide exploitation in the right direction. It is up to governments to enact such laws, on the advice of technical foresters, but they can obviously only be given effect by forest services. The exact nature of police powers to be delegated to a forest service may vary widely. They should clearly provide, however, the power of giving evidence about infringements of forest laws.

A considerable staff is required to carry out all these tasks. Although the importance of these tasks is generally admitted, few countries have provided their forest services with sufficient personnel. The numbers required need not necessarily be in direct proportion to the forest area. But, taking such a proportion as a rough guide, it appears that Latin America still has a long way to go.

Principles of Effective Forest Administration

Forest administration is the organized process by which forest policy and forest law are applied to the forests of a country to produce the benefits and returns desired. Therefore, both policy and law need to be set up as first steps. These define the jobs of forest administration on more or less general lines. Operating administration translates general aims into specific action, in accord with the nature of the forest itself and by using all available information.

Forests are usually far-flung, are more or less remote from seats of governments, are highly variable in their problems and the ways in which they can be effectively managed, and are readily subject to many forms of abuse and trespass. Thus it is for higher leadership of the administrative body—the forest service—to define the methods and objectives of field administration as applied to variable conditions, and to assign categories of tasks and responsibilities to those who actually carry them out. The forest service sees to it through field inspection that plans and programs are put into effect. It pays constant attention to co-ordinating work in different areas and assigning men to tasks for which their abilities are best adapted.

Actual administration should be entrusted to men "on the ground," who live and work in and near the forests. These men need to have the authority to settle most of the day-to-day questions on the spot, following general policies, without reference to higher authority. This decentralization of authority should be in balance with the responsibility assigned to field officers by policy and law. Field—as contrasted to central office — administration is always necessary. Without it, even with very good policy and law, plans for management and protection are not carried out.

Field officers who are entrusted with the authority to match their responsibilities should be fully competent. Work well and impartially done is a sure way to command the respect and support of local people directly affected by forest administration and of others less directly affected.

Since forest administration demands a knowledge and understanding of biology and economics, of human beings and natural phenomena, competent administrators are made and not born. Honesty, industry, knowledge of woodcraft, etc., are essential attributes but in themselves do not make an administrator. To them must be added the teachable skills called forestry. A fully adequate job comes from fully trained men. The level required may be less exacting in early stages of forest administrations, but cannot be overlooked at any stage.

Trained officers must necessarily seek careers. Conditions of employment must attract men of high-level ability to obtain the needed training, and must hold them after they have prepared for forest administration. The essential conditions include assurance of tenure for efficient service; a promotion system based on merit; a salary level equal to that of competitive employment opportunities; clear assignment of duties; authority sufficient to the responsibilities; and leadership which commands and holds respect. Given these forest administration is alive and positive, since it attracts and holds good men. Failing these conditions, administration is form rather than substance.

These correct principles of sound forest operating administration—definition of tasks, decentralization of authority, smooth flow of authority, professional officers, definite leadership, etc., connote an organization of generalists rather than of specialists—of line rather than staff. For certain parts of the total job of forest administration, specialization of function is desirable even in the earlier stages. Thus, for example, basic forest inventories can best be done by specialists. As silviculture begins, facts about behavior of different species, growth, regeneration, etc., are needed and such research can best be entrusted to specialists. The need for other sorts of facts also arises as forest management and administration develop.

The assignment of fact-gathering functions to specialists should never obscure or break up the flow of operating authority from legislative body to minister to chief of service to field officers. The function of specialized staffs is to serve and strengthen the line. Recommendations should come from specialists, decisions from generalists.

Training of Personnel

LATIN America needs 500 professional foresters, including 40 professors, and 750 sub-professional foresters by 1950, if forestry in government service, universities, and in private industry develops at its present rate. If Latin America continues to assure the proper management of its magnificent forest resources, the sound development of its local wood-using industries, and the justifiable growth of its universities, the region needs over 1,000 professional and over 2,000 sub-professional trained foresters, including 70-odd professors for schools now in existence.

These figures did not come from any *sortilego* or fortune teller. They were submitted to FAO's Division of Forestry and Forest Products by 10 of the 20 Latin-American governments in answer to a questionnaire on training and educational requirements. If replies had been received from the other 10 governments, the figures undoubtedly would be much higher.

How many foresters are at work in Latin America now? Replies from 12 countries indicate 300 professional and 450 sub-professional foresters, many of whom would like to have considerably more training than they received in their universities.

Can the universities of Latin America supply the need? The countries which replied to this question stated that in 1950 they hope to graduate about 40 professional and 70 sub-professional foresters. But it is more than a question of numbers of students and graduates. The quality of training is also important if each country's foresters are to be properly prepared for work in government service or private industry, to assure the proper handling of this highly important resource—forests and timber—for the maximum benefit of the people. Most of the agricultural schools and universities, until recently, gave only a few courses in identification of trees and wood specimens, instead of complete training in all phases of silviculture, management, mensuration, protection, policy, finance, and products technology. Several countries are beginning to realize the importance of more complete training and are reorganizing the teaching of forestry in their universities. It will, of course, take time to convince government officials and university administrators of the importance of securing the services of competent professors, of providing sufficient financial support to strengthen the forestry schools, and, above all, of assuring their permanence.

Recognizing that an increase in forestry education will take considerable time, at least five countries who replied to the specific question stated that they wished to send a specified number of students abroad to study forestry or to have technicians from other countries visit them to give instruction and to do research and consulting work. Returning students and visiting technicians will greatly strengthen the newly reorganized forestry schools in the various countries.

This brings up the question, of course, as to whether each country should have a forestry school, or whether a few larger universities or even one large training and research center could best provide the necessary

facilities. FAO's Technical Committee on Unexploited Forests, on which were represented a number of Latin-American countries, meeting in Geneva, Switzerland, in August 1947, discussed this squestion. The committee's recommendation was:

"That FAO take the initiative in organizing a forestry institute with research laboratories in the common interest of the Latin-American countries which urgently need such an institution, and with teaching facilities for the professional training of foresters; that pending the setting up of such an institute, FAO continue to use its good offices to have urgent work for Latin America done in existing laboratories of member countries able to undertake it, and to assure that those countries accept for training in their forest schools and laboratories the forest technicians of Latin America."

With regard to the establishment of a Latin-American Forestry Institute in which research and educational facilities would be centralized, there are a number of alternatives:

1. Among the larger Latin-American universities which already have well-established science departments and research facilities, one might be persuaded to include such a school.

2. The Inter-American Institute of Agricultural Science in Costa Rica might be willing to provide the necessary facilities.

3. The Hylean Institute of the Amazon, soon to be created, might be a suitable organization for this purpose.

Perhaps professional training could be provided at one place and sub-professional training at a number of smaller centers in several countries.

All of these alternatives, obviously, would require ample financing, and the several governments would have to contribute towards a Forestry Institute.

With regard to the exchange of students, there are a number of arrangements already in operation between European and Latin-American countries, as well as with the United States of America. France and other European countries have indicated to FAO that they are willing to accept students from Latin-American and other countries in their universities, but financial arrangements must be made in most cases by the students themselves, their governments, or by other sources.

A number of universities, philanthropic organizations, and government departments in the United States of America provide financial assistance to students of forestry and it is hoped that forestry agencies of the various governments will increasingly avail themselves of such possibilities.

There have also been important instances of private individuals or companies in the wood-using industries in a number of countries who have financed the training of promising young technicians in England, Italy, France, Sweden, and the U. S. A. Every effort should be made to develop such interest and to take advantage of these opportunities.

It should be clear that there is now, and will continue to be for some time to come, a serious need for more well-trained professional and sub-professional foresters. Existing schools in Latin America need to be strengthened greatly if they are to provide this training. Inasmuch as not all governments can afford a complete forestry school, the recommendation should be considered of setting up a Latin-American Forestry Institute. This might be done at a large established university or in connection with certain inter-governmental projects such as the Turrialba Institute or the Hylean Amazon Institute. Financial support from each of the Latin-American governments must be assured for this purpose. In the meantime, all governments should take advantage of existing fellowships and scholarships in agriculture and forestry now offered by governments, philanthropic organizations, individuals, universities and colleges in various countries, and by companies in the wood-using industries.

No one of these measures is sufficient by itself. Advantage should be taken of *all* the opportunities, and the interest of government officials should be aroused to the importance of strengthening forestry education for the welfare of the people of Latin America.

The Forest Inventory

THE forest resources of a country are a valuable asset which, if they are wisely managed, can make important contributions to the national wealth for all time to come. On the other hand, they can easily be destroyed by reckless and unplanned exploitation. The first essential in planning forest management is the preparation of an inventory of the forest resources. Until this is done, the authorities responsible for forest administration must work, as it were, in the dark.

A forest inventory should determine the extent of forest areas, the volume of standing timber, and the distribution of forest ownership. It is also essential to determine the relationship between annual growth and annual fellings plus losses from natural causes.

It must be remembered that absolute accuracy is not possible because of the difficulties of precise measurement and because changes constantly take place within the growing forest. Fortunately, absolute accuracy is not necessary and some degree of approximation will suffice for practical purposes. In highly developed countries where all forest lands are intensively used, a high degree of precision in inventory methods may be necessary and its relatively high cost may be justified; but in countries where the forest resources are in an early stage of development, a lower degree of precision may suffice. In either case, the forest inventory should be repeated periodically, and more intensive methods can be undertaken in the less highly industrialized countries when changing conditions warrant.

Because the more intensive methods are much more expensive than those of less precision, it is important when planning an inventory to determine what degree of precision is justifiable in view of the economic conditions in the country concerned. In some countries it may be desirable to use one standard of precision in the more accessible forests, and a lower standard in those which are more remote.

Inventory Methods

The two principal methods used in making a forest inventory are surveys on the ground and aerial photogrammetry. A third method, useful in connection with the small but important forests occurring on farms, consists in the collection of statements from individual farmers in the course of an agricultural census.

Ground surveys permit the collection of more detailed information on the kinds, volumes, and ages of trees in the forest than is possible by aerial methods. On the other hand, aerial surveys provide forest maps which are far more accurate than those which can be made at any reasonable cost by ground methods. Hence, it is a common practice, when inventories of large forest areas are made, to use the two methods in conjunction.

In very small forests every tree can be measured. In larger forests ground survey methods for the preparation of maps depend on information noted by survey parties which traverse the forest along lines running in directions and spaced at intervals determined in advance. Information regarding the kinds, volumes, and ages of trees, and other descriptive data, are based on a system of sampling. In one widely-used system small plots are established at regular intervals along the lines traversed, and the trees and other vegetation within each plot are measured and recorded. Subsequently, the records from all the plots within a given forest type are averaged and these averages are applied to the whole area of that particular type to determine total volume of timber, distribution of age classes, etc.

Two types of aerial photographs, usually referred to as verticals and obliques, have been successfully used for forestry purposes. In vertical photography the camera is pointed directly downward from the aircraft and in oblique photography it is pointed forward and downward. Thus, the vertical photograph is, in effect, a map or plan of the area shown on the print and the scale depends on the height of the aircraft and the focal length of the lens used. If the latter conditions are the same, the oblique photograph covers a larger area, but there is a progressive distortion from top to bottom of the print which reduces its value for map purposes. Vertical photographs are preferred for original mapping, but oblique photographs, which are much cheaper, have been used with good success in periodic reinventories of forest areas previously mapped by vertical methods.

The scale of photographic prints has an important bearing on the amount of forestry information which can be read from them. Enlargement of scale increases visible detail but, because the area covered by a large-scale photograph is small, the use of a large scale means relatively high cost. For general guidance, it may be said that a scale of 1 to 16,000 has been found satisfactory for most forestry purposes, but some preliminary forest inventory work has been done at scales as small as 1 to 25,000.

From a national point of view, it may be very advantageous to use a single series of aerial photographs for multiple purposes, such as topographic mapping; geologic, waterpower, and mineral investigation; surveys of agricultural and grazing lands; and forestry. In certain countries the scale of 1 to 16,000 has proved to be an acceptable compromise in meeting the special requirements of different users.

To countries in which present knowledge of the extent and nature of the forest is small, aerial photography, together with a limited amount of sampling work on the ground, offers by far the quickest and cheapest way of obtaining the information requisite to the early stages of forest management.

However, the compilation of maps from air photographs requires the establishment of a certain amount of ground control — that is, a series of accurately located points on the ground which can be identified in the photographic series. In some cases ground survey work already completed will be found to suffice, but in others establishment of further ground control points may be necessary.

Interpretation of forestry information obtainable from aerial photographs requires special skill. Provision must therefore be made for training selected forest officers in this art or, alternatively, for intepretation by a qualified air survey company.

In planning a program of air photography for forestry purposes, it is very important to determine correctly the kind of photographs which are to be taken. Contract specifications for vertical photography should include provisions covering the scale of prints, amount of overlap of adjacent prints, types of film and color filters to be used, flying altitude, focal length of lens, and other points. Advice on such technical matters should be sought from sources possessing accumulated experience in this field.

It is of interest to note that considerable progress has been made in certain northern countries in the estimation of timber volumes directly from air photographs. Up to the present, this technique does not appear to have been adapted to conditions found in tropical forests.

With respect to small forests on farms, attention is drawn to the fact that plans for the World Census of Agriculture in 1950, being submitted by FAO for the consideration of governments, provide for the collection of information respecting such forests from their farmer owners.

Classes of Inventory Information

The four main classes of information required in an adequate forest inventory were mentioned briefly at the beginning of this paper. With respect to some of these, there is almost no limit to the amount of detail that can be collected. However, for countries whose forests are in an early stage of development, it is much more important to obtain general information of reasonable accuracy regarding the first three of these—areas, volumes, and ownership—than it is to obtain great detail with respect to any one of them. The following paragraphs indicate the amount of subdivision of information which is considered to be fundamental.

The most important part of any forest inventory is

the correct determination of forest areas. These areas should be subdivided, both on maps and written records, into "Productive Forests" and "Other Forests," the latter class comprising areas occupied by trees but unsuitable for forest management because of poor growing conditions. Forest areas should further be subdivided into the principal forest types or natural associations of tree species. As a minimum requirement, coniferous and nonconiferous forests should be segregated. If air photographs are available, it should be possible to introduce still further subdivision with very little additional effort and cost.

Estimates of timber volumes should be made separately for coniferous and nonconiferous species. In tropical forest light hardwoods should be separated from heavy hardwoods, if possible. The ideal condition is reached when separate estimates of merchantable volumes of individual species of economic importance can be made.

For preliminary purposes, it may suffice to describe the areas of forest ownership in broad classes—public, institutional, and private. At a later stage, the timber volumes or productive capacities in the different categories of ownership should be estimated separately.

The estimation of annual growth, or of potential annual yield, to be expected from large unmanaged forests is complex and difficult. This investigation will inevitably require time, but a program of research should be undertaken at the earliest possible moment.

Possibilities for International Co-operation

In certain natural regions, such as the Amazon Basin, several adjacent countries possess parts of one great natural forest. In these circumstances, two or more countries may desire to map their own forests through aerial surveys, and very considerable economies might be possible if such countries entered into a joint contract with a single aerial survey agency. In general, one large survey project can be undertaken more cheaply than a number of small projects because equipment and personnel can be continuously employed for considerable periods of time in a single region.

A further opportunity for economy may be found through support of a regional research project which would study, among other forestry questions, the rates of growth in the forests of that region. It would obviously be inefficient for a number of adjacent countries to engage separate research staffs, all of whom would be working in a single region.

Functions of FAO

Acting in accordance with the recommendations of its annual conferences, the Forestry and Forest Products Division of FAO is now engaged in compiling a new statement of the forest resources of the world. In this undertaking, it has used a specially designed forest inventory questionnaire which has the approval of two special international conferences on forest statistics. Because of this approval, the outline of basic inventory information indicated by the questionnaire can be recommended with confidence to countries planning inventories for the first time.

The Organization is at the service of its member countries and is prepared to furnish, or to secure, competent advice on inventory and other forestry problems for countries that request it. It will be glad to assist interested countries wanting to get in touch with competent experts or air survey companies in other lands, or wishing to make arrangements for special training for their own nationals. Similarly, FAO is prepared to give member countries all assistance possible in the organization of joint approaches to inventory problems.

Forest Legislation

THE welfare of a nation requires the maintenance and proper management of its forests. The forest policy of a country should express this public interest. Such a policy must be given concrete form through forest legislation which, in turn, must provide for the creation or strengthening of a government agency to formulate and enforce specific regulations, in order to ensure that the policy is carried out.

Forest Policy

Sound forest policy may differ from country to country but the general principle is virtually the same for all—achieving the greatest good for the greatest number for the longest time.

The principal objectives of a forest policy should be:

1. To maintain or create, and subsequently protect against natural enemies or human misuse, an area of forest adequate to conserve or improve a country's water and soil. So long as this aim is not fully achieved, the need to preserve or create forests must be given due consideration in agricultural development, since forests are a vital prerequisite to a healthy agriculture.

2. To devote to forest all suitable land which is uneconomic for cultivation or animal husbandry, either temporarily or permanently, and to protect such land against all abuse or accidents.

3. To prescribe treatment and management for all forests so as to maintain their productivity; to yield their owners as high a return as possible, in products or in income; to satisfy domestic needs for all types of forest products at a reasonable price; and at the same time to provide a basis for permanent employment in forest operations and wood industries.

These primary objectives entail certain secondary objectives, such as improvement of public health, preservation of indigenous flora and fauna, protection of the countryside, and creation of tourist and recrea-

tional facilities.

The preamble to any forest code or fundamental legislative enactment must clearly set forth its aims. It may differ for each country, but should be basically in accord with these principles. It must be a precise statement of the objectives to be attained under given local conditions.

Forest Legislation

A comprehensive legislative enactment or forest law is necessary to carry out forest policy and protect the public interest.

Even though personnel and funds may initially be inadequate to administer a comprehensive forest code or act, a complete framework should be drawn up so that all the necessary elements can be gradually incorporated as circumstances permit.

Two points must be included:

(a) The enactment must define the administrative agency charged with carrying out its provisions and must make provision for the training of personnel. The agency should be independent and its attributes should not be split up amongst different administrative services or departments.

(b) It must recognize and circumscribe a forest domain and define the various parts of which it is to be composed.

The forest domain should comprise all forests in existence at the time the forest law is drawn up, and should include such wasteland as it is expedient to devote to forest purposes. To determine the legislative treatment proper to these areas, they may be considered from three different viewpoints:

(a) Forests covered by the description above of the first objective of forest policy must be considered as essential and should be classed as "protection forests." Whatever their form of ownership, legislation must ensure their protection against all misuse. For other forests, on the contrary, legislation may be more flexible, since in some cases it may be more economic to devote forested land to growing agricultural crops rather than trees. Sometimes land may be better alternately cultivated and left fallow under a forest cover. Nevertheless, haphazard clearing of forests for cultivation should be controlled and the proper administration of woodlands coming into this category should be ensured.

(b) Forests can be classified according to the relative urgency of bringing them under effective statutory control. This is particularly appropriate in underdeveloped countries embracing vast forest tracts. It would obviously be a mistake to impose strict regulations everywhere, since it might be out of the question to develop certain parts of the forest domain except in the very distant future. It is far more urgent to concentrate attention on areas of immediate importance. For instance, the forest law should initially apply to protection forests, already in existence or about to be created, and which are presently threatened. Thereafter it should apply to forests which, although not classified as protection forests, are already opened up for exploitation or will shortly be so. These latter might be classified as "reserved forests." Over remaining parts of the forest domain, which may still be extensive, it may be sufficient to define certain rights of usage, remembering that nothing is more useless than a law that cannot be enforced.

It is obvious that the forest domain, within the meaning of paragraphs (a) and (b) above, must be subject to change. Unclassed forests may be made into reserves as circumstances warrant and the forest service is expanded. Similarly, the need to dedicate an area as a protection forest may only subsequently become apparent. Legislation must therefore leave room for adjustments, but must establish definitely the procedure to be followed in classifying forests.

(c) Finally, the forest domain can be divided into national forests, comprising all areas belonging to the central government; forests owned collectively by states, provinces, communities, etc.; and privately owned areas. The legislation appropriate to each kind of ownership will vary, and again must differ according to whether or not the forests in question are classed as protection forests or reserved forests. Legislation must, in each case, define the jurisdiction of the central government and the exact functions of the forest service.

In this connection, attention should be drawn to three important points: (a) Whatever the form of ownership, a large number of forests are subject to certain rights of usage, of greater or less importance, which should not be ignored lest the whole economy of a region be thrown out of balance. Established either by title or custom, they may be cutting rights for certain requirements, grazing rights, or may be even more extensive. These rights must be defined and limited, and, in certain cases, will have to be restricted to certain areas or abolished outright. (b) The need to maintain or re-establish a forest cover may often necessitate that lands under collective or private ownership be subject to special regulations, considerably restricting vested rights. Legislation will have to determine such restrictions, the procedure for their implementation and, as the ultimate step, the compensatory terms or indemnities to be granted to the owners concerned. These restrictions may, in certain cases, lead to expropriation, the procedure for which must be laid down in the same enactment. Conversely, it may be judged expedient to alienate certain tracts of national forests in the interest of the general economy of a region. The procedure for alienation should also be laid down by the Forest Law. (c) An individual owner or a whole community may, voluntarily or under compulsion, undertake forestry work, such as making plantations, which represents a long-term investment and which is more of a public than a private benefit. Legislation must in these cases require the government to provide indemnities and special advantages.

This classification will have certain consequences which the law will have to regulate. Independently therefrom, the law must lay down the principles of proper protection and exploitation for each of these classes of forest land. Lastly, it must define infractions of the law and establish penalties.

Forest Protection

Once the forest is protected against misuse by owners through this system of classification, it still must be protected against: (a) *Natural hazards,* such as fire, insects, and disease. Requisite legislation may vary greatly from case to case. Fire is by far the most serious hazard and legislation must be directed at both prevention and remedial measures. The use of fire within and near the forest must be controlled; defense

measures and patrol must be made obligatory. Local residents should be required to assist in fire-fighting, proper fire-fighting services should be established, and other special arrangements should be made. (b) *Unauthorized exploitation* and damage caused, for instance, by unauthorized grazing.

At the same time, the law may also provide for nature preservation, protection of indigenous fauna and flora, and reservation of sites for public recreation or scientific research.

Rational Exploitation of Forests

Legislation cannot go into details of the methods to be followed in every forest to assure regeneration and improve the growing stock. These methods must differ considerably from one kind of forest to another. But legislation must lay down, with no loophole for argument—and this is one of the most essential points of good forestry legislation — *the principle of sustained yield.* It must lay down the procedure to be followed to obtain this result. This will first call for the drawing up of a management plan to be applied over a given period of years and wherein will be the methods to be used in a particular case. The management plan will then be checked by trained and qualified technicians. After all these provisions have been complied with, then it becomes binding and enforceable under the law.

The forest law may contain a certain number of general provisions relating to cutting practices, such as sales in national forests, felling rotations, duration of exploitation, etc.

Investigation and Proof of Infractions

Legislation must finally determine: (a) the procedure for investigation and establishment of cases of infraction, as well as the responsibilities of the various law enforcement agencies; (b) the ensuing legal actions and proceedings once infraction has been established; (c) the nature of infractions and the penalties incurred.

Statutory Regulations

Legislation cannot and should not enter into details of administrative application. This must vary from region to region; regulations will vary accordingly. They need not be considered in detail here. It is sufficient to stress that, whereas forest legislation is the province of the legislative branch of government, the regulations implementing this legislation emanate from the executive branch. The Forest Service as the appropriate executive agency must, therefore, be given the main responsibility for drawing up the regulations.

Officers of Commission I. From left to right: L. J. Vernell (FAO), Secretary; H. Hernández Carabaño of Venezuela, Chairman; G. G. Insfran of Paraguay, Vice-Chairman; and R. G. Guzman of Chile, Rapporteur.

Forest Resources of Paraguay

Presented by the Delegation of Paraguay

Forestry Study—1945

THE greatest natural resource of Paraguay is probably its forests and no doubt the day will come when the supervision of the forests will constitute a very important function of the State.

As the foundation for its supervision of the forests, the State needs certain data on which to base its calculations and standardize its activities. The most accurate information possible on the supply position of all types of raw materials is vital for the success of present efforts in postwar planning. This economic supervision of one whole section of the raw material resources of the nation—the forests—and of the related industries is essential in gaining full knowledge of potential resources. Moreover, private enterprises need additional information for the economic development of the forest resources, which contribute to the public welfare when they are exploited rationally.

The information which is submitted in this report is the outcome of Paraguay's first survey of the volume, quality, and tree species of its forest resources, a study undertaken primarily as a basic contribution to the economic and social welfare of the nation in peacetime. Rapid changes in the economic and social life of the country have increased the need for the publication of all facts which are now available and the conclusions to be drawn from them.

The purposes of forestry supervision in Paraguay are, briefly:

1. To prepare an inventory of the present supplies of wood and other forest products;
2. To determine the rate of growth at which these supplies are increasing;
3. To determine the rate of loss caused by industrial and household uses, hurricanes, fires, decay, etc.;
4. To determine the present consumption figure and the probable future trends in wood and other forest products;
5. To interpret and correlate these data with the present and anticipated economic conditions in order to assist in developing both public and private policies for the efficient and rational use of lands suitable for forest production.

Basis for the Study

This study is part of a series of studies on the multiple aspects of Paraguayan economy prepared by the various sections of STICA (*Servicio Técnico Inter-Americano de Cooperación Agrícola* [Inter-American Technical Service for Agricultural Co-operation]). This organization was created by an agreement between the Governments of Paraguay and the United States of America and its technical staff and budget are provided by the Institute and the Office of Inter-American Affairs.

The supervisor of this project, Mr. Morton A. Klein,[1] previously acted as a technical expert attached to the United States Forest Service. He had no previous knowledge of the Paraguayan timber problems, whereas the census-takers were Paraguayans who had had practical experience in the forests and fields of this country but who were not necessarily forestry experts. However, theirs was a serious piece of research work, for in spite of the difficulties and limitations inherent in it, the study was carefully prepared, making full use of available data and of the cooperative efforts and goodwill of those that contributed to it. Nevertheless, it includes a great deal of estimated data which had to be utilized for lack of relevant statistics and which the authors of the project gathered from all parts of the country and assembled in a general report with due regard for practical criteria, thus reducing the possibility of a very wide margin of error. For this reason, the application of such conclusions to smaller regional areas which have their own peculiar characteristics must be carried out cautiously. They are intended to serve rather as a general basis for the more intensive study of various aspects of forestry economy.

Other studies which are being prepared, particularly the agricultural census, will supersede by more precise information some of the present data on land utilization methods. Soil studies based on aerial photographs and maps have also been prepared. They will show the vegetation zones and indicate more precisely the extent of present forest areas and geographical zones.

Other reports are those of Mr. George Uderitz of the Inter-American Development Commission on forest resources, one on transport problems, and the maps of the Aerial Photography Mission, which may also help in determining and solving the various special problems now confronting the forestry industry of the country.

Furthermore, the census-takers have in one and a half years covered a distance of more than 21,000 kilometers, as follows: Distance covered by air—1,600 km.; by railroad—4,576 km.; by ship—5,400 km.; on

[1] Mr. Morton A. Klein was a member of the Institute of Inter-American Affairs until 1945, at which time he made a report on the forest resources of Paraguay.

horseback and by other means of transport—11,560 km. During these trips they visited all sections of the eastern region of the country and all the sawmills and principal forestry industries, endeavoring to obtain as much information as possible.

They took samples of tree species of various types in each section—counting one by one all useful trees of more than 6 inches in diameter (15.2 cm.) found within a minimum area of one hectare, measuring the girth of each 5 feet (1.5 meters) above the ground and also computing its height.

Whenever necessary, they took samples in larger areas up to 5 hectares. Such samples, selected in representative localities of the forests of each part of the country, have served as a basis for computing the standing timber, posts, and firewood in each type of forest and within specified areas, making allowance for the variations in volume due to differences of terrain, such as valleys, rocky areas, etc. The summary of this data (1943-44) was used for the computation of standing timber actually available in each section and department of the country, as shown in the table below on this page.

Visits were paid to all the public offices in the interior and all possible data were obtained from them. In addition, the principal producers and concession holders in each section were interviewed. It is believed that this study presents the best and most recent data that can be obtained.

Forest Resources

Forest Area

The greater portion of the forest zone is located east of the Paraguay River, bounded, generally speaking, as follows: on the north, by a line which extends from Villa Rosario on the Paraguay River to Pedro Juan Caballero (in the Cordilleras Amambay, on the northern frontier between Paraguay and Brazil); on the south, by a line which crosses 20 kilometers north of Asunción on the Paraguay River and which extends as far as the port of Encarnación on the Paraná River. The portion covered with the densest forest is located on the delta. It extends, 100 miles (160.9 km.) in width, along the Paraná River to the Pirayuí River on the south (50 miles [80.4 km.] to the north of Encarnación) and as far as the cataracts of Guaira and the Cordillera Mbaracayú, constituting a total area of 6 million hectares. The forest islands and the quebracho of the Chaco lie scattered outside this region.

The existing forests of the region east of the Paraguay River have been calculated at approximately 7.8 million hectares, of which 5 million are still virgin forests, capable of producing 280 million m³ of wood which can be considered as marketable, of which 12 percent will probably be of first quality for export purposes; 23 percent of best quality sawn timber type; 33.8 percent of second quality sawn timber type; 17.9 percent of third class sawn timber type; and 13.3 percent of fourth class wood of a type which is not being cut at the present time.

Commercial Varieties

Data by Species

Common Name	*Scientific Name*	*Density*	*Modulus of Rupture*
Cedro común	Cedrela fissilis	0.37-0.75	460- 770
Cedro rá	Cabrale oblongifolia	0.65-0.85	450
Petereby	Cordia hypolenca	0.62-0.71	472
Trébol	Torresea cearensis	0.55-0.65	
Ibyraró	Pterogyne nitens	0.81-0.96	950
Lapacho amarillo	Tecoma ipé	0.95-1.25	1,300-1,500
Lapacho negro	Tecoma ochracea	0.00-0.97	1,000-1,290
Curupay	Piptadenia macrocarpa	1.04-1.18	1,100-1,600
Curupay-rá	Piptadenia rigida	0.84-0.95	1,150
Ibyrapytá	Peltophorum dubium	0.74-1.00	1,160-1,270
Urundeí-mí	Astronium urundeuva	1.21-1.22	930-1,190
Incienso	Myrocarpus frondosus	0.83-0.98	1,200-1,390
Guatambú	Balfourodendron riedelianum	0.75-0.83	1,426
Timbó	Enterolobium timbouva	0.38-0.39	650- 670
Querandy	Aspidosperma querandi	0.75-0.90	
Guyacbí	Patagonula americana		850

Forest Potentialities

Resources

Even after many centuries of agricultural development and exploitation, the forests of Paraguay have changed very little in their total stock and still cover approximately half the total area of the country. The Paraguay River divides the forests into two distinct zones: those of the west which, except for the quebracho trees, are generally dry and poor; and those of the east which are more humid and produce more valuable varieties of wood. In the western region (the Chaco), we find open forests composed generally of small, hard, and malformed trees mixed with cactus clumps and thickets and spiny plants competing for

Existing Timber Stands by Departments

(Based on the Forestry Study for the years 1943-44)

Department	Total Forest Area	Timber for Export	Sawn Timber			Total Commercial Timber	Class IV Commercial Timber	Over-all Total of Timber	Production by Department
			Class I	Class II	Class III				
	(*Hectares*)	(*Thousand cubic meters of roundwood*)							(*Percentage*)
Concepción	1,019,305	9,923	15,380	17,904	6,094	49,301	4,712	54,013	19.0
San Pedro	2,421,959	13,942	24,535	40,048	17,669	96,194	10,081	106,275	37.5
Caraguatay	94,788	114	118	512	608	1,352	526	1,878	0.6
Villarrica	61,900	18	180	280	111	589	74	663	0.2
Yhú	1,048,950	2,949	3,676	12,821	7,647	27,093	6,669	33,762	12.0
Caazapá	638,111	312	1,080	1,523	1,056	3,971	877	4,848	1.7
Encarnación	2,201,006	5,941	20,669	22,281	17,264	66,155	14,499	80,654	28.6
San Ignacio	50,700	6	76	188	116	386	94	480	0.1
Quiindy	67,900	13	131	247	173	564	130	694	0.2
Paraguarí	80,600	6	19	49	29	103	33	136	0.0
Villeta	48,000	0	16	49	27	92	31	123	0.0
Pilar	80,000	0	46	149	53	248	51	299	0.1
Total	7,813,219	33,224	65,926	96,051	50,847	246,048	37,777	283,825	100.0

the fields. The main species include *Quebracho, Algarrobo, Coronillo, Espinillo, Palo borracho* (*Samuhú*), *Paratodo, Palo santo* and *Palo blanco,* scattered over vast expanses of palm trees. Aside from the palms, these varieties are generally very heavy and of dark color. Many of them contain some tannin, though none so much as the red quebracho, which is the most valuable tree.

The hardwood forests of the eastern region vary from open zones near the Paraguay River to densely forested zones mixed with vines and underbrush along the Paraná basin. Nearly all this area is covered with virgin forests. The most important species are: *Cedro, Lapacho, Ibyraró, Petereby, Incienso,* and *Palo rosa.* However, there are approximately 200 known species which need further study and experimentation in order to determine their most appropriate uses. This region represents one of the richest sources of Paraguayan raw materials because of its wood and the excellent soil of the plateau of the Upper Paraná.

In several zones of this vast virgin forest region, the varieties most valuable for export purposes have been logged (cedar, lapacho, etc.) and have been replaced naturally by a secondary growth of inferior species. During the last few months, STICA has been making a study of the forest resources of each department and section of the country. This study includes several maps indicating the individual forest zones and several tables and charts showing the total volume of wood available, the extent and nature of its exploitation, the sawing methods used, the cost of production of logs, ties, etc., and other relevant data. It is hoped that this study will afford a sound basis on which Paraguay can plan the extensive development of its forestry industry. This study has already been completed in the eastern region of the country and the particulars of the general situation according to preliminary calculations have been shown in detail on maps and charts.

Prospects

A plan for nurseries for reforestation purposes is needed for the central zone. The past experience of the National Agronomical Institute confirms the prospect that this plan can be carried out but indicates, however, that special attention must be paid to it and that large investments must be made which will allow for the complete solution of the problem. The soil and climate of the central zone are perfectly adapted to species of rapid growth, such as the eucalyptus, the pine, the poplar, the willow, etc. These species would be remunerative if they were used to produce sawn timber and posts, as windbreaks, or for the embellishment of small farms.

As previously indicated, the need for all types of modern equipment for production purposes is urgent. The problem concerns private industry primarily, but even so a considerable amount of technical assistance would be required.

There are in Paraguay more than 100 species of trees which at the present time have little or no commercial value and which need further intensive study and experimentation for the determination of their properties. One of the results of such studies would be to ensure the proper utilization of these trees so that valuable logs should not be used as firewood, etc.

If all the necessary improvements are to be carried out, it would be advisable to establish a forestry office or institute, composed of representatives of both government and private industry, whose function it would be to co-ordinate all such activities. If adequate capital and competent technical assistance were made available, such an agency could initiate a program of reforestation, facilitate the installation of modern sawmills, recommend government measures, and also supervise the progressive improvement of the forestry industries of the country.

In short, it is indicated that Paraguay should very seriously consider the problem of the maximum utilization of its forestry resources or, what amounts to the same thing, that it should endeavor to cease being exclusively an exporter of raw materials to other more highly industrialized nations and become a producer of manufactured articles for both the domestic and foreign markets.

Countries such as Paraguay which limit their forestry economy to the production of raw materials cannot achieve any progress, in spite of all their efforts toward increasing their production, as these would only result in damaging consequences on account of the depletion of natural resources.

Industrialization affords a solution to this problem as it creates a permanent local market for raw materials and some of the profits can be reinvested with a view to maintaining or increasing those natural resources, thus preventing their depletion.

Industrial Exploitation

Eastern Region

Approximate figures on the forest resources of the eastern region of Paraguay indicate that there are some 7,812,619 hectares of forest land with a total volume estimated at 2,569,746,000 cubic meters of wood of all types and classes. Of this total, however, there are only 33,224,000 m^3 of "exportable" wood, judged according to present standards and methods of exploitation. It is probable that only one quarter of this volume would be accessible now, the balance being out of reach economically, due to the present system of exploitation and to the antiquated and costly methods of transportation.

Calculations show that there are only about 4 cubic meters of these exportable woods per hectare in all the forest lands. Undoubtedly, some of the zones have greater concentrations of these valuable woods than others and it is there that exploitation operations are being carried on, particularly in zones that are densely populated with woods and advantageously situated near existent rail and water transportation.

To compare relative values: the collective sum of forests of all classes in the entire eastern region consists of 2,569 million cubic meters. The annual cutting of trees in the whole world is 2,645 million m^3 (56,000 million cubic feet, according to Zon and Sparhawk). Almost half of this quantity is produced in the North American Continent.

Western Region (Chaco)

There is no information available concerning metric volume, with regard to the forest wealth in the Chaco region.

From present commercial operations and from the work done by Dr. Bertoni it is known that there is a quantity of trees containing tannin, such as *Quebracho colorado, Algarrobo blanco,* and others. In addition to these important trees containing tannin, there are the *Guayacan,* the *Caranday,* the *Palo santo,* and others of high value for construction work and other uses that require durability and resistance to deterioration. Several varieties of palm trees that are useful to man are also found.

Without a definite exploration across this region, the forest wealth will remain unknown and will produce only the value that present commercial enterprises can extract.

Types of Wood

Exploration of woods in the western region of Paraguay indicates that timbers of an "exportable" size and quality (50 cm. by 5 m.) are estimated to be in the neighborhood of 33 million cubic meters, representing about 12 percent of the total of the present forests which can produce marketable timbers.

However, not all these "marketable" timbers could be extracted and placed on the markets under the present conditions of exploitation.

Class I, which has identical technological characteristics as "exportable" logs (except that their diameters are smaller and they have minor physical defects), is represented by good commercial woods, such as *Lapacho, Cedro, Petereby,* etc., and is calculated at about 66 million cubic meters comprising about 23 percent of all marketable woods.

Class II is represented by woods known in the country but of less importance in the markets: *Ybyrapytá, Laurel, Guatambú,* etc. It represents about 96 million m³ or 34 percent of the "standing" exploitable total. The rest of the forests consist of such trees as the *Urundey, Palo macho, Timbó,* etc., which are used by local consumers and are not worth transporting over great distances, and such trees as the *Ombú, Samuhú, Aguaí,* etc., which probably are inadvertently cut during operations and which have no definite value. Collectively, these two categories represent about 88 million m³.

Besides these two classes, which are suitable for the production of sawn timbers, there are trees which produce valuable beams, telephone and telegraph posts, and fence rails. These represent about 73 million m³. There are approximately 2,000 million m³ of fuelwood. In addition to all this wood available for immediate exploitation, there are trees of all classes, measuring from 15 cm. to 35 cm. in diameter, which are growing and whose volume today is about 173 million m³. There is no doubt they will yield a considerably greater volume during the next 25 to 30 years, when it is presumed that the tree whose diameter is less than this in 1946 will be ready for cutting in 1970-75.

A total recapitulation of existent marketable woods, adaptable to the production of finished woods, indicates considerable possibilities in the direction of an economic development and an appropriate utilization of these resources.

Type of Wood	*Million m³*	*Percentage*
Exportable wood	33	12
Class I	66	23
Class II	96	34
Classes III and IV	88	31
	283	100
Beams and poles	73	
Firewood	2,000	

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Forestry Plan of Uruguay

Extracts from a Report Presented by the Delegation of Uruguay

URUGUAY is primarily a country of grassy plains with natural forests forming a link between the Brazilian forests and the pampas. The forests have always been limited to these three types: mountain forests; strips of woodland or "corridor woods" growing in the alluvium deposits of the rivers and streams; and savannah woodlands comprising isolated clumps of vegetation and palm groves. The forests have never extended far from waterways because their expansion has been checked by the unfavorable ecological conditions of the pampas where the soil is dry and contains much clay but little humus.

The soil of the pampas, rich in fine natural pasture lands, is consequently used for livestock raising. Excellent breeds of cattle and sheep have been developed, and the livestock reproduction rate is one of the highest in the world.

Need for Reforestation

Forests were never a predominant natural feature of Uruguay and, although they previously covered a larger area than they do now, they were never of major importance. The size of the original forest area, in its state of natural equilibrium, has been estimated at approximately 10 percent of the total land area. It should be the aim of Uruguay to restore and even improve this equilibrium, for the destruction caused by mankind has created problems of erosion which can to a great extent be remedied by reforestation.

The forest area of the country is estimated at 339,793 hectares of indigenous species, and 66,738 hectares of species of foreign origin, totaling 406,531 hectares, or 2.215 percent of the total area of the country (1946 agricultural census). The forest area now under State reforestation is about 0.072 percent of the total.

The area which is considered most favorable and satisfactory for forests, meeting both the climatic and ecological requirements, is estimated at 12 to 15 percent of the total area of the country, or 2,160,000 hectares at the minimum figure of 12 percent. This figure compares unfavorably with the 406,000 hectares now under forests.

There is a long way to go, and action must be initiated immediately. Afforestation should be carried out in appropriate locations, on land which cannot be used economically for stock breeding, crop farming, or general agriculture, i.e., on the following types of land:

Swamplands	340,831 hectares
Mountainous and stony lands	947,000 hectares
Sand dunes	52,670 hectares
Total	1,340,501 hectares

These areas should be afforested because:

a) the cost of the land is lower than elsewhere;
b) the land is unsuitable for any other types of profitable exploitation;
c) these areas are particularly suited to the development of forests;
d) the land requires afforestation for soil conservation (following the denudation of mountain slopes by erosion or alluvial invasion), for the elimination of swamps by land reclamation, etc.

Present Program

Various isolated agencies are working in a somewhat tentative manner and without any great support:

The *Forest Service of the Ministry of Agriculture and Livestock Industries* is carrying out forest management on the islands of the Uruguay and Negro Rivers, the Island of Gorriti, Andresito Park, Cape Polonio, etc., with an aggregate area of more than 10,000 hectares under its jurisdiction.

The *Toledo National Tree Nursery of the Ministry of Agriculture and Livestock Industries* is responsible for the production of forest trees. Average annual production amounts to 2 million trees.

The *Highway Tree Conservation Service, Highway Division, Ministry of Public Works* is in charge of forest management and administration in national parks, which cover a total area of 2,145 hectares.

The *National Commission for the Parks of Santa Teresa and San Miguel, Ministry of National Defense,* is responsible for the management and administration of the National Parks of Santa Teresa and San Miguel, which cover 800 hectares.

The *National Insurance Bank* supervises the 270-hectare Joaquín Suarez Park.

A.N.C.A.P. (National Administration of Alcohol and Petroleum Fuels) takes charge of a 250-hectare forestry project at Joanicó, Department of Canelones.

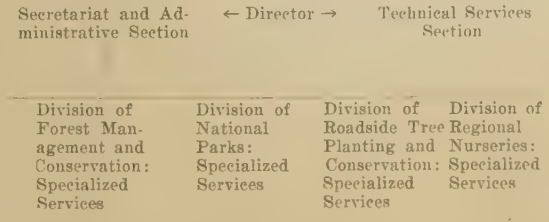
The total area coming under the responsibility of these agencies is approximately 13,465 hectares.

Future Program

A Forestry Plan, constituting part of the National Plan for Agriculture and Livestock Breeding, the purpose of which is precisely to improve the present conditions indicated above, has recently been drawn up with the assistance of some of Uruguay's greatest experts. Another extremely interesting plan which supplements the one mentioned above has been prepared by the National Parks Commission.

The first step in the consolidation of Uruguay's forestry effort should be the unification into a single agency of all existing services and the improvement of their working conditions. Thus, a Forest Department, a Forestry Institute, or a Ministry of Waters, Forests, and Wildlife Resources should be created. The latter type of organization is especially to be recommended in this field of work because these three natural resources are closely interrelated.

Once this union is accomplished, work assignments to intensify all present activities will be distributed as shown in the chart.



Functions of Proposed Forest Department

The proposed Forest Department would study and plan the country's reforestation program on the basis of an over-all plan for a specified number of years. It would also make detailed studies of such a reforestation plan for those areas where the work is most urgent, such as mountain regions, sand dunes, etc.

The most economical way of putting this into practice would be by direct or indirect planting of trees (the latter being known as natural afforestation), utilizing to the maximum the natural agents of seed dissemination, such as wind, for strip regeneration of dunes (partial afforestation); and for waterways, by the establishment of seed-bearing forests at the sources of the main rivers and streams, etc.

The Department would study and distribute the tree species most readily adaptable to conditions in Uruguay and commanding the highest values in local and foreign markets.

It would arrange for rotation in forest exploitation, replanting with quick-growing species in some areas, so as to recover short-term capital investments, and would combine this method with the planting of slower-growth species of greater value in rotation systems ensuring sustained yield—the fundamental principle of modern forestry.

It would organize the importing and sowing of species of foreign origin on the basis of similarity between climatic and ecological conditions in Uruguay and in other areas or countries, replacing the practice of haphazard importation of species, which, except in a very few cases, has been the usual procedure up to the present.

Finally, it would formulate a large-scale management and development plan as the beginning of a coordinated, organized forest policy. The work would be distributed among its subsidiary bodies.

The *Division of Forest Management and Conservation* would build up the forest of the country for commercial purposes, creating timber-producing forests to supply raw materials for telegraph poles, fence posts, railroad ties, wooden boxes, pitprops, furniture, wood pulp and cellulose, pine resin and its by-products, etc. The Division would also deal with forests as influencing factors, e.g., in causing rainfall, maintaining an even climate, and controlling waterways, river level, floods, and erosion. Of these, floods and erosion are major problems in Uruguay. Arable land is greatly reduced by erosion, which carries away 25 million cubic meters of agricultural soil yearly to the ocean-bed, where it remains.

In addition, the Department would have the task of conserving timber-producing forests by directing, supervising, and inspecting the exploitation of natural forests. Even though private forest property would not be under the jurisdiction of the Department, the destruction of privately owned forests by persons ignorant of proper technical forestry methods, or by negligence or wantonness, should be prohibited and made punishable by the State, because the natural forests of today are the foundation of the national forests of the future.

With respect to the legal phase of the problem, a forest law is most urgently needed. Although five projects have been put forward by various institutions, the country still lacks such a law. It may be mentioned that Uruguay is one of the few countries which do not yet have a forest law, while it has the lowest index of forest lands in the Americas and consequently is in great need of forest legislation.

The *Division of National Parks* has the function of studying, organizing, and managing five types of recreation areas, namely:

1. *National Parks.* Because of their size, area, scenic beauty, forest value (natural or artificial), potential utilization, etc., these constitute attractive sites for the Uruguayan people—a place of recreation and rest in natural surroundings, a source of inspiration, and a cultural center.

2. *Natural Monuments.* These include areas noted for certain salient features of their botanical, geological, or geomorphological structure which make it desirable to preserve and develop them as centers for recreational and educational purposes; and smaller areas of unusual character (sand dunes, mountain regions, palm groves, thermal springs, etc.).

3. *Historic Sites.* These are true national monuments, commemorating historic events fundamental to the evolution of Uruguay's national sovereignty. These solemn memorials of the historical past (Agraciada, Sarandi, Las Piedras, etc.) are sources of education and inspiration, stimulating and inspiring in present and future generations love and respect for national history and for those who made Uruguay a free nation, and contributing to the revival of the patriotic fervor of the nation's independence.

4. *Natural Reserves.* Small areas which are still virgin should be preserved to remain as vestiges of the original land, giving due prominence to the labors of a progressive people whose passage upon this earth shall not have been in vain. These are virgin sites, kept in their excellent natural state—places of refuge, rest, and meditation.

5. *Wildlife Sanctuaries.* These are areas in which typical specimens of native fauna now threatened with extinction can be concentrated in natural habitats where small birds, rheas, coypus, and other animals may live in complete freedom and pursue their natural pattern of life. It is possible in these areas to conserve and promote the breeding of birds and animals for later distribution throughout the country. Here would be zoological parks without barriers, moats, or cages, for the education of the public.

It will be seen from the above that the work of the Division of National Parks is of a very complex character in its technical, social, administrative, and educational aspects. This work has great future possibilities, which should be studied with the utmost care.

The *Division of Regional Nurseries* would be charged with the task of producing the trees required for the national afforestation plan, with a minimum annual production of 16 million trees. Its organization would be radically different from that of the existing body.

Instead of only one National Tree Nursery at Toledo, there would be need for eight or nine specialized regional tree nurseries, with a minimum annual production of 2 million trees each. The location of the nurseries should be such that seedlings would never have to be moved more than 200 kilometers and, if possible, they would be located at the center of the area to be afforested.

These nurseries should be specialized in the production of particular species and types of plants for well-defined ecological zones. Specialization permits standardization of production, hence lowering production costs considerably. Each nursery should be equipped with a modern watering system (overhead sprinklers) and adequate machinery for potting, treatment, packaging, etc., thus permitting large-scale production with less manpower.

Various types of nurseries are contemplated to specialize production and ensure economical afforestation:

1. *Sand stabilizing nurseries*, producing mainly large numbers of cluster pine, *Acacia trinervis*, and eucalyptus, as well as other species on a smaller scale.

2. *Mountain tree nurseries*, producing conifers, such as *Pinus insignis*, *Pinus pinea*, *Pinus canariensis*, araucaria, cypress, eucalyptus, etc.

3. *Lake tree nurseries*, producing willow, poplar, and bald cypress trees.

4. *Riverside tree nurseries,* producing oak, ash, elm, willow, poplar, bald cypress, white acacia, etc.

The Division of Regional Nurseries would entrust to its seeds branch the collection, classification, and packaging of seeds of tree species to supply the needs of the entire country. Seeds classified and certified (for purity, germinative power, etc.) are needed. Current prices for such seeds are very high.

The *Division of Roadside Tree Planting and Conservation* would be entrusted with the task of caring for trees along roadsides, in order to improve the landscape and to protect road foundations and road structures. Planting should be tastefully carried out, avoiding monotonous rows, insofar as possible, alternating trees of different species and allowing for long vistas. Parks will be laid out at road crossings of the major rivers and streams, with smaller parks alongside the highways, as places of rest and enjoyment for the traveler, at points of scenic interest.

Attention should be mainly concentrated upon roads having the largest tourist traffic. Wide, tree-lined avenues, on the model of the German *Autobahnen* and the United States parkways, would be developed along the highway routes (road from Colonia to Chuy and the Pan-American Highway).

Roads and highways are the "front garden" of the country and deserve to be studied intensively in order to improve the already beautiful landscapes of the countryside.

Personnel for Forestry Work

Uruguay has undertaken to solve the problem of training personnel for forestry work. There is a course in silviculture at the College of Agriculture of the University of Montevideo, supplemented by courses in related subjects such as botany and tree classification, geology, geomorphology and ecology, land measurement, hydraulic engineering, drawing, etc. The creation of specialized training for the functions of agronomist and forest engineer, involving an intensive one-year post-graduate course, is under consideration.

A training course for forestry experts is already under way, under the auspices of the Labor University of the Ministry of Public Education. A program is being prepared for a School for Forest Rangers, for the supervision and application of forest law.

Stimulating Public Interest in Forestry

In Uruguay the stimulation of public interest is begun in the primary schools by the celebration of Tree Day in September and of Tree Planting Day in May. The children of all primary schools throughout the country participate in these celebrations and learn to love trees and forests. The object of these special days is to make the people forest-conscious from childhood up, and to arouse interest in trees. Similar activities are continued among adolescents in high schools.

An Honorary Forestry Committee has been set up under the Ministry of Agriculture and Livestock Industries. Its function is to carry out a forestry publicity program by means of publications, organization of forestry exhibitions, and publicizing of current research work over the radio and in the press. This Committee is also in charge of the free distribution of seeds to those who request them. In 1947, 1,500 kilograms of seeds, obtained from official institutions which assist in this work, were distributed.

The College of Agronomy, through its Forestry Department, publishes extension courses which are mailed out to individuals for their instruction and guidance in silvicultural work.

There is a great deal of interest in forestry matters in this country and the problem of the forests has become a popular one. There is no doubt that the reorganization of the forest services will have the support of the Uruguayan public.

To stimulate this interest further, it will be necessary to increase material for publicity by means of motion pictures, a medium which has proved very effective, as the Uruguayan public is much attracted to this means of diffusion of knowledge. A useful activity would be the making of national films to present forestry problems more directly.

The Southern Region of Brazil

Presented by the States of São Paulo, Paraná, Santa Catarina, and Río Grande do Sul

REPRESENTATIVES of state governments, of labor organizations, of public service enterprises, and of the forestry technicians of the Southern Region of Brazil met as a separate commission and submitted the following report to the Brazilian delegation.

Utilization of Forest Resources

Recommendations

1. In view of the fact that the production authorized has always corresponded to the requirements for domestic consumption and exports permitted to foreign countries, the Commission recommends that no increase in production be authorized unless efficient means of transport and concrete orders from foreign markets for supplies in excess of domestic consumption have previously been secured.

2. Since the production of the sawmills now operated is limited to between 25 and 50 percent of their full capacity, the Commission recommends that no permission be given for the construction of new sawmills until it has become possible to eliminate the system of restricted production.

Limits in Utilization

In view of the data which our Commission has at its disposal, it is possible to hope that the exports of wood from the Southern Region of Brazil may attain the following figures beginning with 1949, if the steps which have been recommended are adopted:

Pine:	m^3
Sawn timber	4,000,000
Processed wood	250,000
Veneer and plywood	100,000
Hardwoods:	m^3
Sawn timber	400,000
Processed wood	60,000

The Commission, taking into account domestic consumption requirements and existing stock piles, believes that the country can export the following quantities and volumes in 1948:

Pine:	m^3
Sawn timber	1,546,000
Processed wood	210,000
Veneer and plywood	99,999
Hardwoods:	m^3
Sawn timber	220,000
Processed wood	60,000

Prefabricated Houses

A new industry for the utilization of pine is being developed in Brazil, the prefabricated house industry. To be suitable for this purpose the pine wood has to be properly treated.

During the current year the southern zone should be able to export about 10,000 houses, and for the year 1949 it will be able to export approximately 50,000 houses.

Measures for Reaching Production Targets

In order to achieve the proposed expansion, the Commission considers necessary the adoption of certain measures with reference to matters of transportation and finance.

1. Transportation:

(a) Improvement of the present railroads, including tracks, rolling stock, and locomotive power;

(b) Adaptation of the highways to large-scale traffic;

(c) Acquisition of trucks and guarantee that there will be no lack of fuel (gasoline and petroleum);

(d) Improvement of transportation and construction of adequate warehouses;

(e) Assured maritime transportation to foreign countries in order to prevent the accumulation of stockpiles and their subsequent deterioration.

2. Finance:

In a country such as Brazil where there are considerable difficulties to be faced, where distances are enormous, where the means of transportation are unreliable and inadequate as well as expensive, and where the wood produced never reaches the consumer markets until about two years after its cutting and processing (due to the great delay in processing freight car requisitions), it is impossible to carry on wood production without making credits available.

The present restrictions on bank credits for industry and commerce, the high rates of interest, the enforced prohibition of export to the European, Asiatic, and African markets as a result of the suspension of the purchase of pounds sterling, the depression of the domestic market, and the competition which arises in the only foreign market accessible at the present time (Argentina), are the factors that have brought the Brazilian wood industry to the present serious crisis. Unless this situation is immediately dealt with intelligently and firmly, it will ruin one of the mainstays of the national economy, transforming into junk heaps this magnificent and valuable industry built up by overcoming all difficulties and on which the economy of the southern States is based.

Consequently, in order to achieve any expansion whatsover, in order to protect the wood industry, in the interest of the States themselves, it is advisable to lay the foundation of favorable conditions for the exportation of wood and for the granting of credit or the financing of sawmills, wood industries, and wood exports.

For this purpose it is necessary to draw up a simple plan that can be carried out with the full guarantee of a financial agency, which might be the *Instituto Nacional do Pinho* (National Pine Institute), as this has at its disposal land and financial resources adequate, in the opinion of the Commission, to start such operations. The Bank of Brazil would give its financial support in case the resources of the INP are insufficient.

Sawmill owners should be financed on the basis of their plants and the supplies of pine and other commercial species such as cinnamon and cedar on their property. They would liquidate their debts in monthly installments against the delivery of official permits authorizing production.

The industrialist (the manufacturer of boxes, plywood, etc.) and the exporter should receive 50 percent of the value of the wood which they have in stock, liquidating their debts in proportion to the shipments authorized by the National Pine Institute, which is the controlling agency in wood industry and trade and which is adequately equipped to perform this function.

However, no matter what may be the method of financing decided upon, it is certain that without transportation and financing, mill-owners and industrialists will not be in a position to increase their production but will be obliged to reduce production even below its present very low level.

It is, therefore, urged that the public authorities do not allow our wood industry to be completely abandoned and to fall into ruin. That would be fatal both to the economy of the southern States and the living standards of a great portion of the population and, as is well known, very serious consequences would result for the social order and welfare of the nation.

Exploitation of Coastal Forests

There also exists the possibility of the exploitation of the coastal forests, which are rich in hardwoods. For such exploitation purposes, the country needs:

1. Health services in the coastal regions, principally in the zones most easily accessible to exploitation. Such a provision is essential.

2. Permission to construct new sawmills in this region according to the most highly recommended technical methods.

3. The rational exploitation of forest lands with due regard and obedience to the regulations of the Forest Code.

4. The financing of industrialists as recommended above.

The exploitation of such forests would have the advantage of facilitating the transportation of processed wood to the ports of embarkation.

Protection and Development of Forest Resources

In view of various types of projects which were suggested by its members, in particular the contributions of the representatives of the State Forestry Service of São Paulo and of the Soroabana Railway Company, together with supplementary measures which may be necessary for larger-scale utilization of materials, the Commission thought it appropriate to adopt the following objectives:

1. To establish proper management in the exploitation of existing forests in the Southern Region with a view to achieving the maximum yield considered economically sound without endangering their reforestation.

2. To reforest the areas which have already been exploited and which may be the basis for the development of a wood industry in the future.

3. To recommend measures of fire control.

Once the existing forest capital of the Southern Region has been satisfactorily assessed and efficient measures have been adopted to manage properly the extraction of wood and reforestation, it will still not be advisable to permit the installation of very large sawmills even in the event of a great expansion in sales of wood abroad which would make it possible to do away with the present system of limitations. This measure is intended to prevent the rapid exhaustion of the forest reserves of the country, which would obviously harm the national economy in the future.

The Commission approves entirely the results of the Latin-American Conference on Forestry and Forest Products as regards the rational exploitation of forests, their protection, and the measures which will accelerate the recuperation and reforestation of those areas which have been exploited. It further believes that these resolutions should be carefully examined by the Brazilian Government so that the recommendations of the Conference may serve as a basis for the reform of the Forest Code, now being studied, and so that this Code may be put into effect.

In consideration of the statements of its members the Commission is aware that experience has already demonstrated the infeasibility, principally from the technical point of view with reference to the conservation of stands, of the reforestation of the country solely on the basis of private initiative. It recommends also that the National Pine Institute and the Forest Services, both Federal and State, should jointly undertake reforestation work. As for the replacement of trees felled by timber industrialists, the Commission recommends that it shall be incumbent upon the INP to supervise this work, delegating to it the powers of these industrialists as required by the relevant provisions of the Forest Code.

Moreover, the Commission recommends that the Federal and State Governments shall study the existing forest formations of the Southern Region for the purpose of establishing forest reserves intended for the conservation of the local flora and fauna. The Commission notes also that it is of prime importance in commercial transactions to initiate a listing of forest species on the basis of the specifications of the Institute of Technical Research of the State of São Paulo.

Aside from the recommendations mentioned above in this report, the Commission resolved unanimously to submit to the consideration of the Brazilian delegation the following proposals:

1. Creation of forest institutes and technical courses for forest foremen and laborers;

2. Installation of adequate wood-processing plants for the drying and impregnating of wood in suitable localities;

3. Adoption of adequate measures for spreading knowledge of the use of appropriately treated woods, for the purpose of the preservation of railroad ties and posts intended for use on the railways and public service facilities.

4. Installation and maintenance of a publications office and creation of an international Latin-American Library on Forestry and Forest Products in charge of the National Pine Institute.

In concluding the present report of the work of the Commission of the Southern Region of Brazil, the members stress the fact that in the report submitted, only the most essential points have been treated, but that it is necessary for consideration to be given also to details contained in the documents accompanying the report.

Commission II meets to deal with the problems of forest management and forest administration.

The Work of FAO

Forestry and Forest Products Statistics

THE first compilations by an international organization of statistics on forestry and forest products were undertaken by the International Institute of Agriculture at Rome in accordance with a resolution adopted by the General Assembly of the Institute in May 1922. The first results were published in 1924, but the first International Yearbook of Forestry Statistics did not appear until 1933.

The International Timber Committee (CIB) in 1933 commenced publication of a series of monthly statistics covering international trade in forest products.

In 1935 a Committee of Statistical Experts of the League of Nations recommended for universal adoption a "Minimum List of Commodities for International Trade Statistics" which included sections relating to wood and cork and to pulp and paper. This list was revised in 1937 in conformity with a revision of the "Draft Customs Nomenclature" and was published by the League of Nations in 1938.

In 1936 a mixed commission, representative of the International Institute of Agriculture and the International Institute of Statistics, submitted to the 23rd Session of the latter organization a report containing a series of classifications and definitions recommended for general use in the compilation of statistics on forest resources. This was published in the proceedings of the International Institute of Statistics.

A special subcommittee of the Committee of Statistical Experts examined the various aspects of timber statistics and presented a first report in 1936, which included "a complete minimum program of national timber statistics." This report was circulated to governments for their comments, subsequently revised by the Committee, and published by the League of Nations in 1938 under the title "Timber Statistics."

Although many governments had recognized the desirability of reaching agreement on uniform methods of compiling and presenting forestry and forest products statistics, the outbreak of war in 1939 forestalled international action which might have led to the formal adoption of the reports referred to in the previous paragraphs. Further developments in this field had to await the cessation of hostilities.

The First Session of the Conference of the Food and Agriculture Organization of the United Nations, held in Canada in the autumn of 1945, decided that international action in the field of forestry and forest products should be one of the principal activities of the new organization. The Conference recommended that consultations preparatory to a world survey of forest resources and forest inventories should be undertaken, and that priority should be given to "the resumption of statistical series [relating to forest products which had been] interrupted by the war, and to the continuance for peacetime purposes of new series instituted during the war." The Second Session of the Conference, held in Denmark in 1946, recommended that "All countries should be requested to supply to FAO as soon as possible their most recent statistics on forest resources, annual growth, annual drain, and forest products."

In accordance with the recommendations of the Conference, a draft program and draft questionnaires for international statistics on forestry and forest products were prepared by the Forestry and Forest Products Division of FAO, due consideration being given to recommendations of the prewar committees, to experience gained in connection with the timber statistics program of the International Timber Committee, and to further developments during the war years. This draft program was submitted to two international conferences on forest statistics, convened at Washington and Rome during the early months of 1947. The Conference at Washington was attended by representatives of 15 countries of North and South America, the Far East, and Oceania, and by a representative of the Caribbean Commission. Representatives of 13 countries of Europe and the Mediterranean area and a representative of the Timber Subcommittee of the Emergency Economic Committee for Europe participated in the Rome Conference.

The draft program and draft questionnaires prepared by the Forestry and Forest Products Division were amended in accordance with the recommendations of the two special conferences, and received formal international approval at the Third Session of the Conference of the Food and Agriculture Organization of the United Nations, held at Geneva in 1947.

Up to the present time, little recognition has been given to the connection which exists between the administration and conservation of forests, on the one hand, and the production and distribution of forest products, on the other. The Forestry and Forest Products Division of FAO is committed to the principle that these two branches of human activity should no longer be considered independently of each other. The statistical program of the Division embraces both forestry and forest products in order that supply, as represented by the forests, may be correlated with demand, as represented by consumption of forest products. Certain classifications and definitions, which are common to both aspects of the program, are discussed

hereunder.

The basic statistics prepared by FAO are presented in units of the metric system of measurement. In certain cases, tables expressed in metric units may be supplemented by tables showing the same quantities in units commonly used in commerce.

Quantities of wood are expressed in terms of solid cubic volume. Bark is not included in the volumes of standing timber and roundwood products. Volumes reported to FAO in other units of measurement, such as piled or stacked measure (stere, cord, fathom, etc.) are converted to equivalent solid volumes through the use of standardized converting factors. Quantities of wood reported by weight are similarly converted.

It is hoped that statistics relating to wood and to wood products other than pulp, which are now recorded in some countries in terms of weight, will be replaced by records of volume. Weight is an unsatisfactory basis for the measurement of wood because of wide variations in moisture content and because of the differences in specific gravities of woods from different species of trees. Hence, a given weight may represent widely differing quantities of wood volume.

Quantities of wood pulp, paper, and other pulp products are expressed in terms of weight. It is desirable that pulp statistics should be based on a defined moisture content.

Conifers (softwoods) and broadleaved woods (hardwoods) are the two principal classes of woods. Wherever possible, statistics relating to the products of these should be stated separately.

Statistics of forest resources representing the situation existing in 1947 have been collected. This program will be repeated in about five years. Statistics of forest products are being collected and published annually, on a world-wide basis. A program of quarterly statistics of forest products for Europe, in which the United States of America and Canada co-operate, has been instituted under an arrangement between the Timber Committee of the Economic Commission for Europe and FAO. Programs for quarterly statistics in other regions may be instituted as need arises.

Statistics of forest resources will be published on the completion of each periodic forest inventory. Annual statistics of forest products will be published in forest products Yearbooks, and quarterly statistics for Europe will be issued as rapidly as the results can be compiled.

Forest Resources

The program of forest inventory statistics is intended to secure, from time to time, the most up-to-date information relating to the extent and condition of the forests of the world. These periodic reports will also give valuable indications of the status of knowledge of the resources in different countries and, when taken together, will indicate improvements in that knowledge from period to period.

Current inquiries are concerned principally with those areas now bearing forests. Although it is recognized that there are many denuded areas in the world which could and should be reforested for the production of timber or for the protection of soils and other assets, it has not yet been possible to devise definitions of such lands which would be applicable to all conditions and to all countries.

The following list of classifications and definitions has been approved for international use. It is considered that the main headings constitute a basic minimum of information which is essential to an understanding of the forest situation of any country. Some of the more advanced countries already possess inventories prepared in far greater detail, and others will doubtless follow their lead. It is hoped, however, that countries who may be undertaking inventory projects for the first time will accept this internationally approved list as a guide to their essential minimum needs for information.

LAND CLASSIFICATION

Classification	*Definition*
FORESTED LANDS	Lands bearing vegetative associations dominated by trees of any size, capable of producing timber or other forest products or of exerting an influence on the climate or on the water regime. Also, lands from which forests have been recently clear cut or burned, but which will be reforested in the near future.
Productive forests	Forested lands physically capable of producing crops of usable wood.
Other forests	Forests incapable of yielding products other than fuel because of adverse site conditions. This category includes forests of slow growth and of dwarfed or stunted form.
NONFORESTED LANDS	
Cultivated lands and natural grasslands	Lands under cultivation, and natural grasslands whether used for grazing or not.
Other lands	Brush lands, moors, deserts, sand dunes, bare rock, swamps and bogs. Also areas occupied by towns, roads, etc.

CLASSIFICATION OF PRODUCTIVE FORESTS

ACCESSIBLE FORESTS	Accessible forests are those which are now within reach of economic exploitation as sources of forest products, including immature forests. This category includes all productive forest lands owned by corporations or individuals, all publicly owned forests covered by working plans, and other public forests not covered by working plans but considered to be accessible for exploitation now.
Coniferous (softwoods)	Forests in which 75 percent or more of the volume of standing timber is of coniferous or needle-leaved species.
Broadleaved (hardwoods)	Forests in which 75 percent or more of the volume is of broadleaved species.
Mixedwoods	All other forests.
INACCESSIBLE FORESTS	Forested lands of productive quality which are not yet economically accessible.
(Subdivisions to be the same as for *Accessible Forests*)	

OWNERSHIP OF PRODUCTIVE FORESTS

PUBLICLY OWNED FORESTS	
State forests	Includes productive forested lands owned by national, state, provincial, and cantonal governments, etc., and forests of government-owned corporations.
Forests in which felling is prohibited	National parks and other recreational forests and forests maintained for the protection of watersheds, etc., from which removal of forest products is prohibited.
Forests in which fellings are permitted	National, state, provincial, and cantonal forests in which cutting, either by the state or by private operators, may be permitted.
Communal forests	Forests belonging to town, villages, and communes.
Forests in which felling is prohibited	Parks, protection forests, etc.
Forests in which fellings are permitted	Other communal forests.
Forests reserved for the benefit of native tribes	Forests reserved for the use of native tribes, or managed for their benefit.
FORESTS OWNED BY INSTITUTIONS	Forested lands owned by religious and educational institutions.
PRIVATELY OWNED FORESTS	
Owned by industrial corporations	Forested lands owned by industrial partnerships, corporations, co-operative societies, etc.
Forest estates	Forested estates, owned by individuals or single families, excepting forests included within the boundaries of farms.
Farm forests	Forested areas within the boundaries of farms and primarily used to supply wood for farm needs.

GROWING STOCK ON ACCESSIBLE PRODUCTIVE FORESTED LANDS

CONIFERS (SOFTWOODS)	Cubic volume of wood, without bark, contained in all coniferous trees 10 cm. or more in diameter, when measured over bark 1.3 meters above ground level. When possible, volumes of the more important individual species should be estimated and estimates should subdivide volumes contained in trees 10 cm. to 25 cm. in diameter from those of larger trees. Volumes may be based on (a) total volumes including all

	wood from ground level to the top of the tree, or (b) they may exclude the volumes contained in stumps of standard height and in the tips of trees above a standard minimum diameter of the boles. The basis used in computing statistics of standing timber should always be stated. It is important that computations of volumes of annual growth, losses from natural causes, and fellings should be computed on the same basis.
BROADLEAVED (HARDWOODS)	Same as above, but volumes may or may not include branchwood.

ANNUAL GROWTH OF FORESTS AND ANNUAL DRAIN

GROWTH AND DRAIN IN ACCESSIBLE PRODUCTIVE FORESTS	
Total annual growth (gross increment)	The total volume of wood produced by all trees in the forest (usually computed as an annual average for a 10-year period).
Losses from natural causes:	
Annual losses from forest fires	Average volume of roundwood rendered unusable annually by fire during the past 10 years.
Average annual losses caused by insects and tree diseases	Average volume of roundwood rendered unusable annually by insect pests and tree diseases during the past 10 years.
Average annual losses caused by climatic factors	Average volume of roundwood destroyed annually by windstorms, ice, etc.
NET AVERAGE ANNUAL GROWTH	The net volume remaining after subtracting natural losses, as defined above, from total annual growth.
AVERAGE ANNUAL FELLINGS	Average volume of roundwood, exclusive of bark, felled annually in the forests during the past 10 years, whether removed from the forest or not.
BALANCE OF GROWTH AND DRAIN	The difference between annual fellings and net annual growth. If growth exceeds fellings, the balance will be positive; if fellings exceed growth, it will be negative.
GROSS INCREMENT IN INACCESSIBLE FORESTS	Estimated potential productivity of forests which are not yet accessible. (No net increment accrues in inaccessible forests because annual growth is completely offset by losses due to natural causes).

Forest Products Statistics

The program of forest products statistics instituted by FAO replaces and expands statistical series interrupted by the war, in accordance with a recommendation of the First Session of the Conference of FAO referred to above. Since the classification and definitions presented hereunder have been approved by international conferences on forest statistics, it is hoped that countries which may be developing systems of forest products statistics for the first time or which may be revising systems already established, will be able to provide for a collection of information regarding the various categories and products defined hereunder.

PRINCIPAL CLASSES OF STATISTICS

Output of the Forest

Wood and other primary products of vegetable origin harvested or collected from the forest. Minor quantities are obtained from trees growing outside the forest.

Wood. The solid volume of roundwood. Most wood is removed from the felling site in an unmanufactured state for use as fuel or for conversion into lumber, veneer, and other products; but some products including hewn railway sleepers (crossties) and posts are often processed prior to removal.

Forest products other than wood. Other primary forest products of vegetable origin (e.g., cork, tanning bark, bamboo, rattan, gums, and resins).

Production

The output of the designed commodity within a country during a defined period. The total production

of primary products is reported even though a portion may immediately be consumed in the production of a more highly manufactured product (e.g., wood pulp, which may immediately be converted into paper as part of a continuous process).

Stocks

The figures in this report comprise stocks of domestic and foreign origin, in the hands of producers or traders at a given date, except that stocks of wood pulp include stocks held by paper manufacturers.

Imports

All products imported for domestic consumption or processing. Figures do not include "in-transit" shipments. They include imports for re-export since these data cannot always be separated from imports for consumption. Export statistics have been adjusted to include re-exports. Unless otherwise noted, goods received from dependent territories and possessions are included in imports of metropolitan countries.

Exports

All products of domestic origin or manufacture shipped out of the country. For reasons indicated above under *Imports,* re-exports are included. "In-transit" shipments are excluded. Exports from metropolitan countries include products shipped to dependent territories or possessions.

Consumption

The calculation of consumption of a product within a country is based on domestic production, plus imports, less exports, with a suitable adjustment for changes in stock during the period under review.

It is important to distinguish between consumption by industry and consumption by ultimate consumers. For example, a country which is a large exporter of paper may consume in its industrial processes very large volumes of pulpwood and wood pulp. The tonnage so consumed may be many times in excess of the tonnage of pulp products ultimately consumed by the people of that country.

DEFINITIONS OF FOREST PRODUCTS

Product	*Definition*
Bark for tanning	Bark from certain tree species, notably hemlock, chestnut, acacia, mangrove, and oak, for use as a source of extracts for tanning purposes.
Broadleaved species (hardwoods)	All woods derived from trees classified botanically as Angiospermae are included in this category. The species belonging to this group are generally broadleaved (e.g. oak—*Quercus,* beech—*Fagus,* maple—*Acer,* lignum vitae — *Guiaicum,* ebony — *Diospyros*). Most of this group are physically hard. However, this category also includes broadleaved species such as balsa—*Ochroma* and poplar—*Populus,* which are physically soft and which in some countries are referred to as softwoods. Most tropical woods are broadleaved.
Conifers (softwoods)	All woods derived from trees classified botanically as Gymnospermae (e.g. pine—*Pinus,* fir—*Abies,* spruce—*Picea,* larch—*Larix,* Parana pine—*Araucaria,* and ginkgo—*Ginkgo*) have been included in this category. (*Note:* The term "softwood," as used in some countries, includes woods which are physically soft, even though some of them may be taken from broadleaved trees. This category, as used by FAO, is restricted to woods taken from the gymnosperm class).
Fiberboard	Boards, sheets, or rolls, used mainly in building, of which the chief raw material is wood. Raw materials may be in the form of wood pulp, waste paper, sawmill waste, screenings, etc. Gypsum board and plaster boards are excluded.
Hardboards (wallboard)	A general term applied to fiberboards (hard and semihard) from 3 to 7 mm. (⅛ to ¼ inch) in thickness, used primarily in partitions, side walls, and other construction work.
Insulating board	Insulating material in sheets or rolls usually from 8 to 20 mm. (5/16 to ¾ inch) in thickness with porous structure and good thermal and acoustic insulating properties. The fibers are sized and felted together to contain a large quantity of entrapped or "dead" air.
Fuelwood	Wood destined for burning for purposes of cooking, heating, production of power, etc. Figures may include wood from trunks and branches. Wood for charcoal production is not included.
Lumber	The term lumber, as used by FAO, covers the following categories of sawn wood: planks, boards, deals, battens, and large timbers, both

	rough and planed; squares; flooring; laths; shingles; and boxboards. It does not include sawn railway sleepers (crossties).
Newsprint	A standard grade of printing paper used in newspapers. It is generally made from mechanical pulp to which 12-20 percent of chemical pulp has been added. The basic weight usually varies from 48-57 grams per m^2 (30-35 pounds for a ream of 500 sheets 24 x 36 in).
Other vegetable fiber pulp	Includes pulps, other than wood pulp, derived from fibrous materials such as bagasse, cotton flax, bamboo, esparto, and other grasses, used for the manufacture of paper, paperboard, and fiberboard.
Paper other than newsprint	All paper other than newsprint, e.g., other printing papers, wrapping papers, tissue papers, industrial papers, building papers, etc. Paperboard and fiberboard are not included under this heading.
Paperboard	The principal categories of paperboard are: (1) paperboard for folding or set-up boxes, (2) container boards for the manufacture of corrugated and solid fiber boxes, and (3) all other paperboards. The term is usually used to designate all grades of fibrous material which are 0.3 mm. (0.012 inch) or more in thickness, made on a paperboard machine. It also embraces thinner products which in manufacture and use are classed as paperboards rather than as paper. Blotting papers and roofing felts are excluded from this grouping.
Piling	Long straight pieces cut from trunks of trees and usually destined to be driven into the ground under impact. They are chiefly used in construction of harbor works and as supports for bridges and buildings.
Pitprops	All round timber used in mining operations.
Plywood	Sheets of wood material made up from three or more layers of veneer glued or cemented together, the grains of adjoining plies usually being at right angles to one another.
Poles	Straight pieces taken from the trunks of trees and more than three meters in length. Poles are chiefly used to support telephone, telegraph, and electrical transmission lines and for scaffolding. In some areas poles of varying size may be used in the construction of dwellings. Poles may be round, square, octagonal, or of other cross section.
Posts	Round, squared, or split wood, usually less than 3 meters in length, used in an upright position for fencing.
Pulpwood	Roundwood for use in the manufacture of wood pulp, including wood pulp for fiberboard.
Railway sleepers (crossties)	Sleepers are pieces of wood, of rectangular or approximately rectangular cross section, laid transversely on the railway roadbed to support the rails. Sleepers may be sawn or hewn.
Sawlogs, veneer logs, and hewn squared timbers	Data refer to the solid volume (excluding bark) of logs destined for sawing and for the manufacture of veneers. Logs transformed into hewn timber (excepting hewn railway sleepers), and roundwood for manufacture into staves (cooperage) and shingles are also included.
Staves and headings (cooperage)	Split or sawn billets of wood used in the manufacture of casks, pails, etc.
Tanning wood	Wood from which extracts are obtained for the tanning of leather and other products, expressed in terms of solid volume under bark. Bark for tanning is listed separately.
Veneers	Thin sheets of wood of uniform thickness, rotary cut, sliced or sawn, for use in plywood, laminated construction, furniture, and veneer containers.

Veneer logs	(See "Sawlogs, veneer logs, and hewn squared timber.")
Wood for charcoal and distillation	The solid volume of wood used in the production of charcoal and to obtain products of the destructive distillation of wood (e.g., menthanol, acetic acid). (Roundwood used for gazogenes is included in the category "All other wood.")
Wood pulp	Fibrous material prepared from wood by mechanical or chemical processes for further manufacture into paper, fiberboard, or other cellulose products.
Mechanical wood pulp	Pulp prepared from wood by mechanical disintegration. Mechanical (groundwood) pulp is used for newsprint and the less expensive papers and for some grades of fiberboard.
Sulphite wood pulp	Wood pulp prepared by an acid pulping process. The liquor used in the sulphite process is an aqueous solution of sulphurous acid in which lime or some other base has been dissolved. It may be bleached or unbleached.
Dissolving sulphite wood pulp	A special grade of bleached sulphite wood pulp of high alpha-cellulose content, suitable for conversion into rayon, cellophane, plastics, lacquers, and for other specialized nonpapermaking uses.
Sulphate wood pulp	Wood pulp prepared by an alkaline process. The chief active constituents of the "white liquor" used in the sulphate process are sodium hydroxide (caustic soda) and sodium sulphide. It may be bleached or unbleached. The latter grade is generally used in the production of kraft wrapping papers and of container boards.
Dissolving sulphate wood pulp	A special grade of bleached sulphate wood pulp suitable for the manufacture of many products for which dissolving sulphite wood pulp is used.
Wood pulp—all other	Wood pulps prepared by processes other than those defined above—includes soda pulp, semichemical pulp, "exploded wood," etc.
All other wood and other wood products	Individual products accounted for under these headings are rarely of sufficient importance to justify separate treatment in international statistics.

List of Forest Products for International Trade Statistics

The following list has been adopted for the compilation of statistics of international trade in wood and products of wood.

- Fuelwood
- Pitprops
- Poles, Piling, and Posts
- Sawlogs and Veneer Logs
  - (a) conifers (softwood)
  - (b) broadleaved (hardwood)
- Sawn and Planed Lumber
  - (a) conifers (softwood)
  - (b) broadleaved (hardwood)
- Hewn Wood
- Sleepers and Sleeper Blocks
- Staves and Barrels
- Veneers
  - (a) conifers (softwood)
  - (b) broadleaved (hardwood)
- Plywood
  - (a) conifers (softwood)
  - (b) broadleaved (hardwood)
- Pulpwood
  - (a) conifers (softwood)
  - (b) broadleaved (hardwood)
- Wood Pulp
  - (a) mechanical
  - (b) sulphite, dissolving
  - (c) sulphite, all other
  - (d) sulphate, dissolving
  - (e) sulphate, all other
  - (f) all other grades
- Newsprint
- Paper other than newsprint
- Paperboard (except building boards)
- Fiberboard
- Other wood products

Note: For Converting Factors of Forest Products Measures, see FAO, *Yearbook of Forest Products Statistics—1947*.

Meetings

Economic Commission for Europe

The Third Plenary Session of the Economic Commission for Europe convened in Geneva on 26 April. Representatives of 18 members of the United Nations and 9 additional nonmember countries took part in the work of the sessions.

The reports of Committees and Subcommittees of ECE were discussed at the earlier sessions and the report of the Timber Subcommittee was unanimously approved. It was hoped that the Chairman, Mr. Bernard Dufay, Director-General of Waters and Forestry, France, who is also the Vice-Chairman of the FAO Standing Advisory Committee on Forestry, would present the report but, unfortunately, he was delayed in France. In his absence, Mr. D. Roy Cameron, Chief of the European Forestry Office of FAO, in his capacity as Chief of the Joint ECE/FAO Secretariat, introduced the report.

Mr. Cameron called attention to the impact of the currency problem as shown in the difference between essential needs and effective demands of European importing countries. He pointed out that the quantity of timber which importing countries were able to buy, while 1.7 million standards below their real requirements, would nevertheless absorb the estimated available supplies, including both European production and imports. For this reason, the importance of the proposed credits for special equipment to increase timber export availabilities was stressed. Mr. Cameron also referred to the agreements registered by the Subcommittee setting buying limits for the first half of 1948 and to the forward step taken in publication of statistics of timber production, trade, and prices.

The Commission agreed unanimously to raise the Timber Subcommittee to the status of a full committee of ECE, recognizing by this action the importance of this commodity in European reconstruction.

The Third Session of ECE witnessed a noteworthy achievement in international conferences, namely, joint agreement reached by Eastern and Western powers on two very controversial subjects. These were relations between ECE and Germany, and the establishment of an ad hoc committee on industry and development.

Unfortunately, it was not possible to obtain the same unanimity on the proposal for the establishment of a committee on agriculture. The Commission, by a majority vote, did, however, set up an ad hoc committee which will examine the means of facilitating an increase in the production of foodstuffs and will submit a report to the next session of the Commission on the best means of ensuring co-operation between ECE and FAO. All member nations made an appeal for unity on this matter. While they differed as to how this was to be secured, there was general agreement that collaboration between all the different political and economic regimes was both desirable and possible.

FAO Council Holds Second Session

The Council of FAO (World Food Council) met in Washington 5 to 17 April to examine the world situation as it is today and as it is likely to be in the years immediately ahead.

Sir John Boyd Orr reminded the Council that there are 150 million more people to be fed and housed today than before the war. "Today there are no new continents to discover. Therefore the additional food must be found from already known resources, and owing to soil erosion some of these resources are diminishing."

The Council recommended specific urgent steps to be undertaken by member governments and FAO to improve the situation.

As regards European timber problems, the Council noted with satisfaction the tangible results achieved by the ECE/-FAO Timber Committee, and requested the Director-General to keep the Council informed about increases in European timber supplies and about progress made in helping European nations to secure the equipment and facilities needed for increased timber production.

The Council expressed particular satisfaction about the efficient co-operation established between FAO and ECE in handling European timber problems, and believed that similar arrangements should be sought, wherever suitable, with regional bodies of the United Nations.

Annual Conference of FAO

The Fourth Annual Conference of FAO will meet in Washington, D. C., U.S.A., the temporary headquarters of the Organization, on 15 November 1948.

Standing Advisory Committee on Forestry and Forest Products

The Standing Advisory Committee on Forestry and Forest Products met in Washington, D. C., U.S.A., from 31 May to 5 June, under the chairmanship of Mr. L. F. Watts, Chief of the U. S. Forest Service. A report of the meeting will appear in the next issue of UNASYLVA.

European Forestry and Forest Products Commission

The European Forestry and Forest Products Commission, composed of delegates appointed by member governments will hold its first session at Geneva, Switzerland, from 6 to 10 July 1948. The proceedings will be reported in a later number of UNASYLVA.

FAO's Mechanical Wood Technology Committee

The Third Meeting of the FAO Committee on Mechanical Wood Technology was held at the Palais des Nations, Geneva, Switzerland, from 8 to 12 June 1948. Mr. Jean Campredon, Director of the National Wood Institute in France, was Chairman of the meeting which was attended by experts in timber mechanics from Australia, Austria, Belgium, Finland, Italy, the Netherlands, Sweden, Switzerland, United Kingdom, and the United States of America.

The chief item on the agenda was a discussion on the methods for testing small clear specimens of wood, with a view to reaching agreement on an international standard procedure for testing.

Other items for consideration included: methods for testing fiber-boards; measures for economy in the production, conversion and use of wood; technological grading of lumber; standardization of lumber dimensions; and forestry combines—establishment and integration of wood products industries on a sustained-yield basis.

A report of the meeting will be published in the next issue of UNASYLVA.

FAO's Wood Chemistry Committee

The Second Meeting of the FAO Committee on Wood Chemistry was held at the Palais des Nations, Geneva, from 18 to 20 May 1948, under the Chairmanship of Dr. Herman Mark of the Polytechnic Institute, Brooklyn, U.S.A. Experts from Austria, Belgium, Finland, France, Italy, the Netherlands, Norway, Sweden, and Switzerland attended the meeting. The main items for consideration included: a report by the chairman on the latest developments in wood chemistry in North America; reports by Committee members on national situations in the field of wood chemical research and industries; the role of the wood chemical industry in forestry combines; and suggestions for FAO's activities in wood chemistry.

A more detailed report of the meeting will be published in the coming issue of UNASYLVA.

FAO Publications

Yearbook of Forest Products Statistics—1947

The first volume in FAO's series of Yearbooks of Forest Products Statistics has now been published, as an English/-French bilingual publication, with a supplement in Spanish.

It contains figures relating to 1945 and 1946 obtained from 75 countries and territories in reply to the FAO questionnaires distributed last year to both member and nonmember governments. Compilation of the Yearbook was made possible only through the active co-operation of ministries, statistical bureaus, and other official agencies of the various reporting countries.

It is recognized that this first Yearbook has serious defects, of such a nature that the advisability of publication in its present form was at one time questioned. Despite these defects, it was decided to publish this volume as a first effort, assuming the information to be of considerable interest to governments and to official and commercial circles. It is most unfortunate that, owing to slow receipt of returns, publication was delayed. Some important returns did not arrive in time to be included even at the late date of publication.

Coverage is incomplete, not only of countries relatively unimportant as producers or consumers of forest products but also of countries of major significance, notably the U.S.S.R. and Germany, which reported their statistics in international publications before World War II.

Further, the range of data supplied by reporting countries for the various statistical items has been irregular. In arriving at regional and world totals, it was therefore necessary to make estimates.

Through the experience gained in the preparation of this volume and the continued co-operation of contributing governments, it is certain that an improved Yearbook for 1948 will result. Certain categories of information not readily available have been eliminated from the second set of questionnaires distributed to governments, thus simplifying the completion of the returns. The extension of FAO's regional activities should also contribute to a greater coverage in area and scope. It is also hoped that more governments will be willing to supply figures in time for the publication of the next Yearbook before the end of 1948.

The Yearbook should be used in conjunction with the information on world forest resources which will be published in the next number of UNASYLVA. It is supplemented by the quarterly statistical series for selected countries, issued in co operation with the United Nations Economic Commission for Europe.

Over a period of years, FAO's statistical program for forest products will disclose significant trends. A clearer picture should then emerge of the balance between both local and world supply and demand, indicating the extent to which exploitation of national forest resources should be restricted or expanded.

In the 1947 Yearbook there are 60 bilingual tables covering output of the forest, production, trade, consumption and requirements of roundwood commodities, lumber, plywood, sleepers (railroad ties), wood pulp by grades, paper, and fiberboards. There are also balance tables for all the major commodities, trade summaries by volume and value, and estimates of per caput consumption of wood and wood products.

The tables are preceded by a textual summary in both English and French which gives the salient conclusions drawn from the information obtained, which is estimated to represent a 48 percent coverage of the whole world. Some of these conclusions are summarized here.

World production of wood in 1946 is estimated at 1,410 million m3 (r), weighing approximately 1,000 million metric tons. Before conversion into semifinished or finished products, this wood had a value of about 7,100 million U. S. dollars. After conversion into primary forest products, such as lumber, plywood, sleepers (crossties), poles, fuelwood, wood pulp, etc., the value was about 14,000 million dollars.

The relative importance of forest output in world economy is shown in the tabulation below:

Product	Production—1946 (*Million metric tons*)	Estimated Value (*Million U. S. dollars*)
Wood	1,000	14,000
Coal	1,100[1]	3,785[1]
Crude steel (ingots and castings)	98[1]	3,715[1]
All grain	500	30,000
Milk	180	10,000
All fibers	7	5,500

[1]All areas except the U.S.S.R.

The 1946 estimated world wood output was 6 percent less than the estimated prewar figure of about 1,500 million m3 (r) in 1937. The lowered output of certain countries, as the result of World War II, was partially offset by greater production in other areas.

World output in 1946 was 5 percent higher than the 1945 figure of 1,340 million m3(r). This indicates the degree of postwar recovery due to the reorganization and refitting of forest extraction and wood conversion industries to meet consumer demands. Recovery has been seriously hampered by the difficulties of obtaining materials and also by exchange difficulties.

World exports of wood and wood products in 1946, measured in terms of roundwood, were approximately 42 percent lower than those recorded for 1937. The greatest decrease occurred in lumber exports, while there was an increase in paper and paperboard exports. The volume of reported 1946 exports in roundwood equivalent was 20 percent higher than the corresponding figure for 1945. Lumber exports increased 4 percent while pulp and pulp products went up 24 percent. It is found that, for reporting countries, 1946 wood exports of 66 million m3(r) amounted to almost 11 percent of total production.

The value of all reported 1946 exports increased 46 percent over 1945 values. Since lumber, wood pulp, and pulp products account for 79 percent of the export values, it is safe to assume that a large portion of the increased value of 1946 exports is due to price rises, which reflect not only increased raw material and operating costs but also the general inflationary trends in most countries.

The major portion of world exports originates in very few countries. For instance, Canada, Finland, Norway, Sweden, and the United States of America accounted for approximately 80 percent of the value of all reported 1946 lumber exports. These same countries, with Newfoundland added, also accounted for about 87 percent of pitprop exports and for practically all reported 1946 world exports of pulpwood, wood pulp, and newsprint.

The average 1946 consumption[1] of wood and wood pulp products for all countries reporting to FAO was 690 kilograms per caput. Taking into account countries which did not submit official returns and which on the whole have a low rate of consumption, estimated world wood consumption may be set at 430 kilograms per caput.

Available data warrant the assumption that at the present time an annual wood consumption rate of 1 cubic meter or about 700 kilograms per caput constitutes

[1]Consumption equals production plus imports minus exports. Here it is calculated in terms of roundwood equivalent of lumber, wood pulp, and other wood-base products.

the minimum level of assuring a satisfactory standard of living in industrialized countries. To meet such a standard it would theoretically be necessary to raise over-all world forest output 60 percent higher than 1946 levels.

Reported consumption is greater than 1,400 kilograms per caput in Finland, Norway, Sweden, Canada, and the United States of America, and less than 70 kilograms per caput in such countries as Egypt, Lebanon, Indochina, and Madagascar.

The 1947 Yearbook, from which these conclusions were drawn, was prepared by Mr. J. P. Kagan and the Statistical Unit of the Forest Products Branch, with the advice and co-operation of the other members of the Division.

Soil Conservation—An International Study

This study was prepared by a group of authors from the Agriculture and the Forestry and Forest Products Divisions of FAO, the United States Department of Agriculture, and Johns Hopkins University. It is thus an attempt to view the great world-wide problem of soil conservation in a broad rather than narrow way.

Indeed, the Introduction sets the frame: "The attention to forest lands and soils in this report is based on the stern fact that a nation cannot conserve its cropland soils and ignore its mountains and forests . . . farming . . . has a vital stake in conservation of mountain forests and soils. . . . Good and permanent agriculture depends on good and and permanent forestry. . . . The great historical lesson of soil and water conservation is very simple: the lands of any nation or region are an indivisible unity . . . the care of land is a prerequisite to survival. Methods and techniques vary from farm to forest to range. But care must be given to each."

The report describes the physical and economic factors which, unless fully understood, lead to creation of severe soil conservation problems, both on crop and forest land. It then turns to a discussion of both the physical and economic losses which result from improper care of soils. Foresters will be particularly interested in the analysis of the ancient and widespread destructive practices which they encounter so commonly in many lands. These include shifting cultivation on forest lands, range burning, lack of fire control, overgrazing, exploitative cutting, and violating land use capability.

In devoting over two-thirds of its pages to conservation methods, particularly of croplands, the report makes no attempt to provide the details of working methods directly usable by the practitioner. Such material, suitable for a handbook or working manual, is cited in the carefully prepared chapter bibliographies. The aim is rather to describe conservation methods and practices in general terms and to indicate how and why they affect conservation of the soil.

This treatment applies to discussions of forest and range land conservation. Various aspects of this are described, such as woodlots, windbreaks, and shelterbelts; good cutting practices; good layout, engineering, and logging methods; and sound forest production planning. Here, and throughout the report, emphasis is given to methods and practices for conserving soil and water, as learned from the world's experience.

Of particular importance are the discussions of land-capability classes, especially of lands suited and not suited for cultivation. If this part of the book alone were put into practice, a vast and continuing wastage of the soils of the earth would be halted and the growing lack of balance between soil productivity of food, fiber, and forests on the one hand, and man's needs on the other, might be bettered. Not that the book deals in exhortation—it does not; but it reports consequences and remedies.

Several other points are worthy of note. The book documents clearly one great reason that forestry properly belongs in FAO—because forestry deals, often competitively, with range and crop lands, with land and its use.

It is well that different groups of technical officers in FAO—agriculturists and foresters—can work together to produce such an integrated work on a subject of such vast importance. However important the separate segments of forest, range, and agriculture are, each in its own right, it is the whole rather than its separate parts, that needs to be understood.

Finally, the total effect of the report is that problems of soil conservation can be solved. Solutions have been reached in various lands, and there is thus no necessity to adopt a hopeless and fatalistic view of the inevitability that destruction of soils must continue as it has in the past.

ECE/FAO Statistical Bulletin

The European Working Group, in co-operation with ECE, has published in Geneva the first of its bilingual statistical bulletins, entitled "Timber Statistics for the Years 1946-1947."

Future issues will be on a quarterly basis and will contain tables covering quarterly output, stocks, sales, and purchases, exports by destination, and imports by origin of sawn softwood, sawn hardwood, pitprops, plywood, and fiberboards (building boards), together with summary tables of exports and imports of all wood commodities. Information for sawn softwoods is given in standards. Elsewhere the metric system is used.

A textual commentary on current trends, as revealed by the statistics, will be included in future issues, together with price reports for sawn softwood and for the more important commodities.

The bulletin now published contains statistics for 1946 and provisional figures for 1947, covering most countries of Europe and, in addition, Canada and the United States of America.

The 1947 European softwood lumber position for those countries which reported statistics in the Geneva bulletin is as follows (expressed in thousand standards): production — 6,650.0; imports 1,959.5; exports—1,179.3; and calculated consumption—7,430.2.

European production of softwood lumber for 1947 for the reporting countries is listed below:

European Production of Softwood Lumber, 1947

Country	Production (*1,000 standards*)
Austria	224
Belgium	30
Bulgaria	70
Czechoslovakia	594
Denmark	51
Finland	710
France	697
Germany:	
British Zone	262
French Zone	270
U. S. Zone	600
U.S.S.R. Zone	—
Greece	11
Hungary	5
Ireland	10
Italy	214
Luxembourg	6
Netherlands	1
Norway	275
Poland	385
Portugal	225
Rumania	214
Sweden	1,200
Switzerland	257
Turkey	46
United Kingdom	68
Yugoslavia	225
TOTAL PRODUCTION	6,650.0

.....Not available.

[1]166,000 standards of this production are sawnwood equivalent of sawlogs cut in Germany.

[2]1 July-30 June.

Reported European imports from the following countries or regions in 1947 are:

Region	Imports (*1,000 standards*)
European countries	1,094.3[1]
U.S.S.R.	35.6
Middle East and N. Africa	*
North America	792.7
Other countries	36.9
TOTAL IMPORTS	1,959.5

*Negligible quantity.

[1]Data for Turkey included under European countries.

Reported European exports to the following countries or regions in 1947 are:

Region	Exports (*1,000 standards*)
European countries	888.7
U.S.S.R.	96.7
Middle East and N. Africa	70.7
North America	—
Other countries	123.2
TOTAL EXPORTS	1,179.3

— None.

News Of The World

The items appearing here are condensed selections of news thought to be of interest to readers of UNASYLVA. *The Editor will be glad to receive direct from readers authenticated items of interest and of news value for this part of the review.*

World Newsprint Famine Surveyed

This article is reproduced from the "United Nations Bulletin" published by the United Nations Department of Public Information at Lake Success, New York, U. S. A.

The world is suffering from an acute shortage of newsprint, together with a "marked inequality in its distribution." This is the chief conclusion reached in a 27-page United Nations report surveying the current production and distribution of newsprint. ("Newsprint" is the class of paper used in the regular editions of daily and weekly newspapers throughout the world. It is normally composed of 75 to 85 percent of mechanical—groundwood—pulp, and 25 to 15 percent of sulphite pulp.)

The report is based on replies of Member governments to a questionnaire prepared jointly by the United Nations Secretariat and FAO. The replies reveal that world production as a whole has dropped fifteen percent below 1937; that Canada is the only key country showing a current gain in newsprint production; that the United States is the only country now using as much newsprint as in prewar times; and that, with the exception of Switzerland, all European countries are very short of newsprint supplies.

The basic interrelated reasons listed by the report for this shortage are as follows:

The wartime destruction of plants.

Shortages of raw materials, fuel, transport, and labor.

Foreign exchange difficulties.

The conversion of newsprint production machinery to more profitable types of paper.

Because of these and other reasons, the report asserts that it is difficult to obtain an exact estimate of the current world demand for newsprint. Governments, in forming their policies, impose priorities, restrictions, and systems of allocation and therefore the "effective demand" for newsprint varies according to these policies.

Canada's Production Gain

Surveying the newsprint production field, the report discloses that Canada, producing over 40 percent of the world's newsprint in prewar days, is the only country reporting a current gain. Between 1937 and 1947, Canada's annual newsprint exports rose from 3,135,000 to 3,812,000 metric tons, but her newsprint exports to the United States increased by 678,000 metric tons. Canada's other customers have been getting the same amount of newsprint as in 1937—slightly more than 500,000 metric tons. Forecast exports for 1948-49 show a decline of over 100,000 metric tons annually to countries other than the United States.

After Canada, the world's major source of newsprint supply is Scandinavia. Here, the report disclosed, newsprint exports from Finland, Sweden, and Norway fell between 1937 and 1947 by 44 percent, although in 1947 exports from Finland and Norway staged a moderate rise. In 1946, the U.S.S.R. received nearly half (105,000 metric tons) of Finland's exports, about ten per cent of which were on reparations account.

Germany, which in 1938 exported nearly 100,000 tons of newsprint, is now out of the world's newsprint trade, and is expected to remain so this year and in 1949. Newsprint supplies in the United States would appear, on the basis of data for the first ten months of 1947, to have been somewhat higher in that year than in 1937.

Still far and away the world's leading consumer of newsprint, the United States showed an average printing in 1946 of 50,928,000 copies of daily newspapers lone, or more than twenty million copies over the comparable figures for the United Kingdom. Though domestic production for the first ten months of 1947 in the United States fell below the comparable period in 1937, newsprint supplies were higher, thanks mainly to increased imports from Canada.

Europe's Scanty Supplies

Reporting that all Europe, with the exception of Switzerland, is either "short" or "very short" of supplies, the survey cites the position of five small countries—Austria, Denmark, Hungary, Ireland, and the Netherlands—as an example. Their current supplies are more than 40 percent below 1937, and even lower than the level of present requirements.

"Nowhere, perhaps," says the report, "does the newsprint picture look so dark as in the United Kingdom, the world's second largest consumer of newsprint." Domestic production in 1947, compared with 1937, had fallen from 813,000 to 256,000 metric tons, imports from 478,000 to 125,000 and current supplies are expected to drop still further to 357,000 metric tons, or less than 30 percent of the 1937 figure.

Meanwhile, newsprint exports from Britain, amounting to 58,000 metric tons in 1937, have now practically disappeared. (All daily newspapers in the United Kingdom are now restricted to four pages, while all circulations are "pegged" by Government regulations.)

In the United Kingdom, the capacity to produce more than 500,000 metric tons of newsprint annually is now lying idle, according to the report. A considerable amount of production capacity is also lying idle in Germany, Japan, and Korea. In Japan itself, the 1948 output of newsprint was just over 80,000 tons, compared with nearly 400,000 tons produced in 1937.

In other parts of the world where needs are smaller, it is reported that generally supplies have been better maintained during the last two years, especially in Latin America. Nevertheless, Australia and New Zealand both contemplate fairly drastic curtailment of their 1948-49 supplies, through reduced imports.

High Installation Costs

Reviewing prospects of future newsprint production, the report attributes the following factors for the very few new mills being constructed:

Increased costs of new installations.

In countries like the United Kingdom, Germany, and Japan, there is a great amount of unused mechanical capacity.

Pulp and newsprint industries suffered as a result of excess capacity for ten years preceding the war.

Newsprint is at present a relatively unprofitable timber product.

Some governments are unwilling to extend cutting areas.

In conclusion, the report states that experiments have been conducted in the use of other fibers, waste paper, and lighter paper, and in de-inking, but these promise no adequate relief within the immediate future. Smaller and less frequent editions of newspapers have, in some countries, resulted in circulations rising above prewar levels, and it appears that the more newsprint a country can obtain the more it uses. This is also true of all timber and paper products.

Silviculture and Management

Australia

Conversion of low production hardwood forest to high yielding softwoods is a project of the New South Wales Forestry Commission. In the Woolgoolga area small pilot areas established some years ago have demonstrated the rapid growth of *Pinus caribaea* and of *Pinus taeda* and it is now proposed to plant some 12,000 hectares (30,000 acres) to be managed on a 40-year rotation for production of saw timber and perhaps turpentine and rosin.

French Cameroon

The forestry development plan includes a surface of 2.3 million hectares with a classified forest area of 750,000 hectares. The latter will form the permanent forest domain and will be subject to special cutting regulations. Utilization will not be limited to the extraction of a few species used for cabinet making. The logging of some 40 species, the technological characteristics of which are already well known, will be required. Cutting figures of 20 to 35 m^3 per hectare have been established on the basis of a 50-year rotation. A very interesting part of the plan is that dealing with stand improvement. Until now, reforestation was mainly a matter of planting a few species considered to be of great value. This method had the disadvantage of high cost. The new plan is based on natural regeneration, which should be possible because of the abundance of natural seeding. Plans will be based on detailed knowledge of the lots to be logged and will apply to trees of all dimensions, seedlings included, of worthwhile species.

Kenya

The planting of 81,000 hectares (200,000 acres) of softwoods in the high altitude country on the equator is being undertaken. A great deal of planting has already been done but the proper development of the timber resources must depend on long term planting. Accessible areas in Kenya were depleted as a result of the war effort and the new plan aims to replace this valuable forest land.

Switzerland

In pursuance of a Federal decree, dated 20 December 1946, the decrease in volume of standing timber which resulted from overcutting during the war years is to be offset by reafforestation work in nonprotective forests. This will consist, *inter alia*, in converting spruce stands, which have become unproductive, into hardwood or mixed stands.

To initiate this program, Swiss specialists are conducting detailed and precise research work primarily concerned with pedology and plant sociology. Depending on circumstances, there will be two alternative courses of action; vigorous intervention regardless of present potentialities or principles of sustained yield, or else delayed intervention in endangered stands. Naturally, stands in a critical condition should be converted first. Others, however, should not be neglected. Obviously, the purpose of this work is to revive the natural vegetation to some extent but not to exclude conifers from the lowland forests where they have sometimes been quite successful.

The technique used will be either direct conversion by planting or seeding to fill in larger or smaller cleared spots in the forest stands, or indirect conversion by means of thinnings followed by natural regrowth aided by seedlings of broad-leaved trees, which may occasionally be found growing in the forest stand. The method will depend essentially on the value and composition of the present stand.

Financial difficulties are actually the hardest ones to overcome. The plan, however, is an original one; it is intended to correct previous silvicultural errors and should receive the attention of all foresters.

United States of America

At a meeting in April the Northeastern Lumber Manufacturers Association, representing lumbermen from eight states, recommended that sound forest conservation should be practiced by all members. The Association is to set up a committee to work out a plan for putting logging operations in the Northeast on a sustained-yield basis. It is recognized that the forest resources of the region have declined, due in part to the hurricane of 1938 and to severe damage by forest fires and insects in 1945-47. In addition, the Association believes that the annual cut has exceeded annual growth since 1939. The Association has been assured that its plan is approved by the U. S. Forest Service, which has promised its co-operation.

The Northwest Pacific Experiment Station has undertaken to conduct interesting experiments in order to determine, in the light of the density of the restocking obtained following the cutting of a stand of Douglas fir trees, *Pseudotsuga taxifolia*, whether it is necessary to intervene with artificial plantings in order to obtain a certain predetermined density for the new stands when they become closed. The practical value of these experiments is considerable, since, if it were possible to achieve specific results, it would be easy to predetermine whether such plantings are necessary for the restocking of cleared stands and also how intensive a planting is required. The tests made constitute an ingenious application of the sampling method and clearly indicate the general prospects of the utilization of such methods. In this particular case, what was done was a simple counting of the number of sample trees actually regrown under varying conditions of exposure, incline, cover, and distance from the sources of seed supplies, and the number of those which had already been restocked fifteen years ago. The results obtained are encouraging and show a clear correlation between the exposure and the density of the undergrowth on the one hand and, on the other, in case of unfavorable exposures, the correlation with the slope. Many divergencies, however, remain unexplained; the action of rodents, for instance, should have been taken into account. Nevertheless, the method used could be applied with profit to a good deal of current research on the reforestation of stands of other species.

A research project attempting to define the scope and methods of forest economics has just been announced by the Charles Lathrop Pack Forestry Foundation and the Society of American Foresters. The object of this study is to point up the economic problems of American forestry, and to clarify the nature of research needed to help solve them. It is hoped that some better organization of the basic principles of forest economics will eventuate to provide future workers with more effective tools, and that a closer definition of the field may be reached, thus making it more attractive to able researchers and students. The decision of the Foundation to support the project was based on its recognition of the relatively undeveloped status of forest economics and of the need for the inclusion of forest economics research of a high order in the solution of many major forestry problems. It is expected that at least three years will be required to complete the study, and that it will culminate in a two-part report tentatively titled "Scope and Method of Research in the Economics of Forestry." It is planned that Part 1 will contain a general discussion of the economics of forestry, the economic problems of forestry, and the types of research needed to help solve them; Part 2 will embody a "case-method" series of study statements, each of which will define a specific research problem, and then consider the best ways of studying it, including the data needed and the best methods of analysis. These statements will be sought from experienced foresters and economists the country over, and it is hoped that their contributions will give not only a comprehensive picture of the many fields of forest economics—such as forest land use, forest management, industry, marketing and prices of forest products, consumption, income, employment, etc.—but also of the various research methods applicable.

Logging and Engineering

Australia

Logging conditions in Western Australia are rather special where jarrah, *Eucalyptus marginata*, and karri, *Eucalyptus diversicolor*, are concerned. Mechanical logging methods have not been used until recently. With the help of springs supporting the free end of a hand cross-cut saw, it is possible for one man to cut trees up to a girth of 7.3 meters (24 feet).

As far as moving the logs is concerned, the maximum distance between the felling site and the loading stages is considered to be 1.2 kilometers (¾ of a mile). Where the distance is longer, it is more economical either to construct a new branch line or a new line altogether for railway transport. In cases where trees are cross-cut

into several logs of average size, these are taken to the sawmills by truck where as very heavy logs are usually taken by narrow-gauge railway. At present, transport by railway has a maximum range of 40 kilometers (25 miles), thus implying that the felling area of a sawmill usually covers a circle with a radius of that distance.

The use of bulldozers and angledozers in the construction of access facilities has brought about great changes in the moving and transporting of logs by opening up otherwise economically inaccessible areas. Transport from the site of felling to the sawmill is currently estimated at 12 to 15 percent of the cost of sawn goods at the sawmill. The recovery of lumber is usually around 35 to 40 percent with 50 percent for sawmills sawing first-class logs of large dimensions.

In this particular part of the country the absence of terrain difficulties allows transportation over long distances so that permanent sawmills can be installed. Selection of sites for sawmills is determined by comparing the economy achieved by proximity to fellings as against proximity to markets. Another factor to be taken into consideration is the water supply. The ideal site would be along a creek on flat and stable soil providing solid foundation for the plant and sufficient space for the construction of dwellings. These sawmills will form nuclei of communities for up to 200 workers and their families. Logging operations therefore will have to be envisaged in a manner which will insure a steady supply to the sawmills for at least 50 years.

Sweden

Floating operations in 1947 suffered heavily owing to low water in all floating channels. At the end of the season no less than 33.6 million logs—corresponding to 2.7 million m^3 (r) (93.8 million cu. ft.)—were left in them, or about 19 percent of what had been reported ready for floating, which means that about seven times as much wood was left in the floating channels as the year before. According to the figures of the Swedish Wood Exporters' Association, 13.8 million m^3 (r) (487 million cu. ft.) had been brought to the channels, i.e., a good 11 percent more than the year before. The timber left was mainly sawlogs, while the pulp and other small wood was floated to a greater extent. The consignees thus received 3.4 million m^3 (r) (120 million cu. ft.) of sawlogs, or about 19 percent less than in 1946, and 8.1 million m^3 (r) (285 million cu. ft.) of other wood, which was about 4 percent more than in 1946. The total quantity floated was 11.5 million m^3 (r) (405 million cu. ft.).

United States of America

An important experimental study of the advantages of preparation of forestry-logging plans before blocks of publicly owned timber are put up for sale has been made by the Western Oregon Branch of the Pacific Northwest Forest and Range Experiment Station. The experimental area comprised 416 acres (168 hectares) of 150-year-old Douglas fir, *Pseudotsuga taxifolia*, which also contained limited quantities of hemlock, *Tsuga heterophylla*, and cedar, *Thuja plicata*. Estimates of timber volumes and a topographic map of the area had been prepared in advance. In the experimental study the forest was divided into blocks, and these were demarcated on the ground. Certain blocks were designated as suitable for partial cutting. Topographical conditions in other blocks made clear cutting and high-lead log transportation essential. Road locations were marked on the ground, and settings for logging machines were located. No clear-cut area was to exceed 80 acres (32 hectares). Stumpage values were determined and the area was put up for sale. Because a logging plan was available, operators were able to estimate their probable costs with accuracy. Partly as a result of this fact, the timber was sold at a total price 70 percent higher than the original appraised value, the difference exceeding $47,000. Total cost of preparation of the plan was $1,575.

Union of Soviet Socialist Republics

Timber felling and hauling are being mechanized in the Byelorussian Republic. Two narrow-guage railways have been built in the forests of the Minsk region, thus considerably facilitating timber transportation to the capital of the Republic. Five narrow-gauge lines have been reconstructed in the Pinsk and Polessia regions. They cross the marshes and link up with the wide-guage railways. At the same time the number of motor trucks used in timber transportation has almost doubled during the last year. Light cranes built according to the special design of a Byelorussian inventor have been mounted on trucks, thus trebling the speed of loading. Electrical saws are being widely introduced and the lumberjacks are frequently exceeding the quotas fixed for electric sawing.

Utilization

Brazil

Service trials of limited numbers of railway sleepers (crossties) made from Brazilian woods have been made since 1930 in the Netherlands railway tracks, observations on their condition being made in 1938 and again in 1947. Sleepers of seven species have now been reported equal or superior to creosoted oak. Included amongst these are four species which are not regarded as first-class sleeper woods in Brazil. As a result of these tests, the Netherlands railways are using Brazilian sleepers on a large scale.

Canada

A recent paper on complete utilization has stated as the theoretical objective of integration in industry a procedure which would enable sawmills and plywood plants to utilize the larger logs while mills making pulp and other related products would utilize the small logs, thinnings, tops, and the so-called waste from the lumber mills. As an interesting trend toward achievement of this purpose the increased use of small logs for processing on the West Coast was noted. A hydrolysis industry might provide the outlet for large quantities of wood waste. The total amount (sawdust, slabs, edgings, and trim) of "waste" in Canadian sawmills in 1944 was about 4,100,000 metric tons (4,500,000 short tons). If this quantity was hydroylzed by the Scholler process about 909 million liters (200 million imperial gallons) of ethyl alcohol could be obtained. However, in actual practice much less material would be available as many mills are already utilizing some of their "waste."

Waste liquor obtained in sulphite pulping is another source of alcohol, and Canada could probably produce 182 million liters (40 million gallons) of alcohol from sulphite waste liquor. A good possibility for utilization of lignin might be found in the electrochemical treatment of waste solutions. A relatively unexplored field of utilization of wood waste is the microbiological approach. In the whole of the paper the term "wood waste" is used as referring to that portion of the tree or log not manufactured into primary products. Studies carried out in Canada indicated that each year production is more than 200 million cubic feet, exclusive of sawdust.

Finland

A factory producing insulation boards has been established in the city of Rauma in proximity to a wood-pulp factory. Production was started in 1945. Total daily capacity is 100 m^3 or 2,500 m^2 of panels of 4 centimeters thickness. The principal source of raw material is pulp made from knots, a by-product of the wood-pulp factory. Further substances used in the manufacture are the caustic residues from sulphite-pulp manufacture which remain after the sugar content has been extracted for distillation into alcohol.

The manufacturing process can be briefly described as follows: the residual liquors from sulphite distilleries together with a number of impregnating substances are added to the pulp from the knots and the mixture is beaten into foam. The mixture is then poured into forms with perforated bottoms moving slowly on conveyor rolls. Sufficient liquid drains through the perforations to leave a mixture that does not spread when the side panels are taken away. The slabs resulting from this first phase can be transported to the dryers which they will pass through on 14 horizontal rollers. The dryers are steam heated and well ventilated. The dried slabs are removed from their perforated bases, sawn to the required sizes and split by band saws into the required thicknesses. The finished panels are then packaged for shipment.

The whole process is highly mechanized. Shifts of 6 or 7 men are sufficient to prepare the dry slabs but additional labor is necessary for sawing and packaging the panels. Since the pulp is not compressed at any stage of the process, the air incorporated into the mixture while it is beaten into a foam ensures that the sheets will have a very high porosity. This accounts for the very low density of 65 to 70 kg. per m^3 and for the high insulation coefficient equaling that of cork, i.e., 0.035. Due to the fact that they are impregnated against mildew, decay, and decomposition and due to their water repellent properties these panels are especially fitted for building construction, especially for heat insulation.

Sweden

Some 65 factories are now making prefabricated houses with an aggregate annual capacity estimated at about 20,000 houses, each containing 42 m^3 (1,500 cu. ft.) or 9 standards of wood. However, since the work is seasonal the full capacity cannot be made use of and actual output will therefore be around 15,000 houses. Of these facttories 38 are affiliated with the National Federation of Manufacturers of Wooden Houses. In 1946 the 36 factories then affiliated delivered close to 11,000 houses, representing some 70 percent of the total estimated output for Sweden. The home market received 7,868 houses of which 73 percent were single-family houses. The amount of timber used for the home market was 317,000 m^3 (s) (67,800 stds.), representing an average of 40.2 m^3 (s) (8.6 stds.) per house. Exports amounted to 3,405 houses representing 85,000 m^3 (s) (18,200 stds.) of wood or an average of 25.2 m^3 (s) (5.4 stds.) per house. Of the total output of affiliated firms, 30 percent was thus exported but only 20 percent of the total quantity of wood used went into the exported houses.

United Kingdom

Laminated wood and metal skis have performed well in their first skiing season and they present a new application for the scientific bonding of wood and metal. They have a steel frame and a wooden running surface. Their high resistance to twisting permits greater speed on turns in racing and also reduces accidents both for beginners and proficient skiers. They are claimed to be 10 percent faster than an ordinary ski and were used by members of the British Olympic ski teams during the winter.

United States of America

A group of research engineers has filed patent applications and formulae from which they claim to be able to produce a crosstie to take the place of a wooden tie. All ingredients are said to be natural products which, when molded, produce a crosstie with the flexibility of a seasoned white oak tie. Spikes can be inserted by force without causing fracture, and the crosstie will not explode, chip, break, or crack in normal use. It is reportedly entirely inert and impervious to moisture, and it will not expand or contract.

Durisol, a new construction material, is now being made from planed and sorted wood chips, chemically treated and impregnated to bring about mineralization of the fibers, then mixed with Portland cement. The material is shaped under pressure and dried into panels, slabs, or blocks of standard sizes. It is said to be resistant to the effects of moisture, fire, and termites, and to have acoustical and insulating qualities. Suggested uses are: insulating slabs, concrete slab filler panels, intermediate floor slabs, exterior wall panels, and combination ceiling slabs.

Monsanto Chemical Company has announced a dry-process waste wallboard sheet which can be used in homes and in many phases of construction. In the Monsanto process a special phenolic glue has been developed. Planer shavings, sawdust, wood fiber, and bark are spread with this glue and subjected to heat and pressure. The results, depending on the amount of binder and pressure, is a smooth wallboard varying from a low density to a high one. The wallboard can be used where strength and not appearance is required. It makes good subflooring, wall and roof sheathing, and building forms. For other uses where appearance is also wanted, there is another type. Using the ugly duckling as a base and overlaying it with various veneers—paper, metal foil, knotty pine slices, fabrics, or highly compressed wood waste—a pleasing board results. Such board is for doors, cupboards, wall and ceiling panels, etc. In both cases, ultimate manufacture with a continuous process is a possibility. The equipment is simple and, with the exception of a hot press, inexpensive.

Economics and Statistics

Austria

It is reported that Yugoslavia will send Austria 100,000 m^3 (r) of pulpwood for which it will receive newsprint, drawing paper, and other paper. The barter arrangement involves transactions valued at approximately one million dollars.

Belgium

It is reported that Belgium's trade agreement with Sweden provides for Swedish exports of 50,000 standards (234,000 m^3 (s)) which may be increased during the last half of the year to 80,000 standards (374,000 m^3 (s)). Belgium may also purchase 35,000 standards (164,000 m^3 (s)) of lumber from Finland and additional quantities from the U.S.S.R.

Brazil

About one third of the country's newsprint requirements are being covered by home production as a result of increased output at the Klabin paper mills at Monte Alegre in the State of Parana. The mills are turning out about 60 metric tons of newsprint a day and almost 40 tons of sulphite wood pulp. Production started in April 1947 and when capacity operations are reached, production is expected to be about 120 tons daily.

The plywood industry is being expanded beyond the existing 250 factories already in operation. Production for 1948 is estimated to exceed 1 million m^3. Until 1948 the United Kingdom was one of Brazil's best plywood customers.

North America

Newsprint production in Canada during March 1948 amounted to 387,672 short tons (351,700 metric tons) and shipments to 380,732 short tons (345,400 metric tons). Production in the United States was 64,894 short tons (58,870 metric tons) and shipments were 65,943 short tons (59,820 metric tons). The output in Newfoundland was 28,510 short tons (25,860 metric tons) and shipments were 22,522 short tons (20,430 metric tons) making a total North American production of 481,076 short tons (436,400 metric tons) and shipments of 469,197 short tons (425,700 metric tons) compared with continental production of 472,341 short tons (428,500 metric tons) and shipments of 465,990 short tons (422,700 metric tons) in March 1947. North American production in March 1948 exceeded that of any March on record.

Finland

An agreement has been concluded with the Board of Trade of the United Kingdom for the supply of 190,000 tons of chemical wood pulp, 30,000 to 40,000 tons of mechanical wood pulp, and 150,000 m^3 solid volume of pitprops, sawn softwood, plywood, and other wood. The Board of Trade is reported to have agreed to supply Finland with 500,000 tons of coal and coke and 40,000 tons of steel. Specific quantities of other goods involved were not disclosed.

Timber exports increased noticeably in 1947. Free exports totaled 1,905,000 m^3 (s) (407,773 stds.) against 1,294,000 m^3 (s) (276,962 stds.) in 1946, whilst reparations exports to U.S.S.R. were 174,000 m^3 (s) (37,287 stds.) and 255,000 m^3 (s) (54,519 stds.) for 1947 and 1946 respectively. Total exports of 2,079,000 m^3 (s) (445,060 stds.) were 34 percent higer than total exports for 1946. The United Kingdom was the chief purchaser buying 48 percent of the total exported.

The aggregate output of Finnish paper mills, which in 1946 was 457,000 tons, rose according to preliminary figures by 66,000 tons, or 14 percent, to 523,000 tons in 1947. The increase is roughly equal as regards newsprint and other paper. Of this quantity 397,500 tons (including reparations deliveries) were shipped abroad, while of the balance of 125,000 tons 64,000 tons were sold on the home market. In 1947 the United States of America was the principal market, taking 85,700 metric tons, followed by the Soviet Union and South America both taking 58,000 tons; next followed Great Britain and Eire—46,000 tons, Denmark—34,000 tons, France—25,000 tons, Holland—20,000 tons and Belgium—16,000 tons. The increase in exports to the United States and South America is particularly encouraging, because it contributed largely to relieve the pressure on Finland's dollar requirements. The restrictions on home consumption enforced in Finland in 1946 were continued throughout the year, and further quantities were therefore set free for export. Because of the rising cost of production the level of prices still tended upwards, but for various reasons it was not possible to obtain sufficient price rises on all markets. In spite of the general upward trend, the financial results were not particularly good because of the home-market prices which are controlled at a level considerably below production cost.

France

The French market for colonial woods is passing through a period of readjustment caused by production trends of tropical woods. Market conditions vary

considerably for the different species. As far as precious woods are concerned, the aim is to establish a great market in France itself in order to achieve practically a monopoly of the sale of these woods. The advantage would be not only for France but also for the foreign buyers who would be in a position to get their whole supply in one place and to make a careful selection with all possible safeguards, since they would be buying on sight instead of having to write overseas to local producers and sign contracts on specifications, as they often had to do until now. As far as veneer woods are concerned, the policy adopted aims at the reverse, i.e., direct sale by local producers to customers in France or abroad. This would principally refer to okoumé, where very severe regulations obtain so that disagreements are easily avoided. The task, however, of reorganizing the trade in colonial woods for current usage is far more delicate. Production of these timbers was developed mainly in order to cover France's reconstruction needs so that until now the policy followed in regard to the greatest part of those timbers was delivery in France at the nearest port to the areas in which the timber would be used. When use of these woods has become accepted, adequate propaganda and satisfactory distribution will be indispensable in order to ensure a stable balance of supply and demand.

Paper production reached a total of 900,000 tons in 1947 representing an increase of 30 percent over 1946. Total pulp production was 375,000 tons in 1947, an increase of 40 percent over 1946. Prospects for 1948 are not considered as very bright, however, and, with the raw material situation still far from satisfactory, the paper mills are inclined to pay more attention to the possibility of home-grown straw.

Japan

There are about 90 wood-pulp mills in Japan proper. Eight mills are classified as manufacturers of rayon pulp and the remainder produce paper pulp of the groundwood, sulphite, kraft, and soda types. Production of all types reached a maximum in 1941 of 1,408,000 short tons, of which 77 percent was paper pulp and 23 percent, rayon pulp grade. Production of all types of pulp in 1945 was only about 18 percent of 1941 production. The chief reasons for current low production are shortages of coal, chemicals, and wood. Approximately 45 percent of the domestic wood pulp for years up to 1942 was produced in Karafuto. The loss of these facilities was especially severe with respect to chemical paper pulp of the sulphite and kraft types. The shortage of chemical pulp, in addition to the loss of sources of desirable pulpwood, is reflected in the decreased quality of pulp and paper. Sulphite pulp is the only chemical paper pulp formerly made in large volume in Japan, but 65 percent of the 1930-1940 production of this pulp was made in Karafuto. Nearly all of the kraft pulp was made in Karafuto during the same period, but by 1945 about 30 percent of the rated productive capacity for kraft was located in Japan proper. Most of the capacity for the production of rayon pulp and mechanical pulp was established in Japan proper. Soda pulp was produced in Japan proper and Formosa. Mills producing this pulp are numerous but they are small, inefficient, and of low capacity. The rayon pulp industry expanded rapidly from 1932 until 1941 but as production did not meet demands, Japan depended heavily on the importation of rayon pulp. Domestic production expanded from an estimated 4,000 short tons in 1932 to more than 325,000 tons in 1941. Production in 1945 was 11,400 short tons.

Lebanon

The furniture industry is one of the most stable in the country. It comprises 10 large manufacturing plants and about 100 smaller establishments. Production covers present domestic requirements with a small surplus exported to Syria. The industry is said to employ 2,000 workers. Wood is usually imported from Poland and Rumania, while veneer is imported from the United States of America and the United Kingdom.

Newfoundland

In 1946-47 Newfoundland imported lumber valued at $610,004, wood manufactures valued at $955,151, and paper containers and wrapping paper valued at $707,087—values in Newfoundland dollars.

Norway

It is now clear that the quantity of logs expected to be felled in the 1947-48 winter season, namely 8 million m^3 (r), has not been attained. This is ascribed to the shortage of laborers, severe cold, too much snow, dissatisfaction with prices, etc. It is now estimated that output will not exceed the 1946 figure of 6 million m^3 (r) with the result that the prospect of increased export of wood is not good.

During 1947, a total of 35,945 metric tons of fiberboard were manufactured and 4,500 metric tons were exported, compared with 6,500 metric tons in 1946. Domestic consumption of 51 m^2 per caput is now about half that of Sweden. Present capacity of Norwegian fiberboard mills is about 50,000 metric tons per annum, but this will be increased to 65,000 metric tons when alterations and extensions are completed.

Poland

Delivery is reported of 300 metric tons of newsprint to the American and British Occupied Zones of Germany. Negotiations for further deliveries of 900 metric tons in monthly allotments of 300 tons were said to be under way.

Sweden

Commercial agreements so far concluded for 1948 cover the following amounts of sawn and planed lumber:

Country	Standards
United Kingdom	162,000
Belgium	80,000
Netherlands	69,000
France and French Empire	19,000
Italy	2,000
Total	332,000

So far during the current year only a few minor sales have been effected to Egypt, South Africa, and Australia and elsewhere to clear off the balance of shipments due under 1947 quotas.

Production of newsprint in Sweden totalled 274,000 metric tons in 1947, compared with 281,000 tons in 1939. Exports in 1947 amounted to 149,000 tons, or 54 percent of total production, whereas in 1939, exports were 176,000 tons, or 63 percent of production in that year. Exports in 1947, by principal countries of destination, are given in the accompanying tabulation:

Country	Metric tons
European countries	32,100
Argentina	31,525
United States of America	25,053
All others	60,411
Total	149,089

Paper and paperboard exports in 1947 amounted to about 560,000 metric tons. Domestic deliveries were kept within the pre-established quota of about 465,000 tons and for the current year the aim is to cut them down to about 420,000 tons with a view to making additional quantities available for export. Negotiations between industries and the authorities have led to an upward adjustment of prices on deliveries for the whole market. This rise exactly covers the higher costs of production caused by the increase in timber prices during the season. On the other hand, this adjustment does not involve any change in the basic prices that have been current since 1942.

United Kingdom

Imports of logs and sawn goods have been particularly heavy in the first months of 1948. Stocks have increased considerably, quality and specifications have been very satisfactory. Nevertheless buying of logs and sawn goods abroad is still severely restricted by the lack of currency and the desire to balance imports and exports. Urgent needs are therefore supplied by importations from British overseas possessions. Construction of sawmills in these possessions will gradually overcome present difficulties. Large shipments of German oak of excellent quality have also been received. Demand for veneer is still very great.

United States of America

Increasing imports of newsprint in January and February 1948 have relieved the newsprint shortage to such a degree that the export market price is noticeably softened with an increasing drop in prices. North American production of newsprint for the first quarter of 1948

is 3,211 metric tons (3,540 short tons) less than the first quarter of 1947. Because of reduced shipments to other countries, Canadian and Newfoundland shipments to the United States increased over 1947. Finland, Sweden, Norway, France, Austria, Netherlands, and Italy also shipped newsprint to the United States during this period.

In connection with the growth of the United States paper industry, figures for production workers and wages in the pulp, paper and allied industries are given below:

Year	Average Wage Earners (*Thousands*)	Total Dollar Wages (*Millions*)
1899	94	36
1919	208	213
1939	265	310
1947	384	929

Policy, Legislation, and Administration

Argentina

By a decree dated 29 February 1948, the government of the Argentine Republic authorized the granting of forestry exploitation concessions to workers' co-operatives to the extent of 2,500 hectares of public forest land.

This type of undertaking has already shown interesting developments in the Chaco and Misiones territories.

Belgium

The Belgium Government, by a decree of its Regent dated 6 December 1947, issued in response to a request from the Belgium Federation of Wood Manufacturers, has undertaken to create a Technical and Scientific Center for the wood-processing industry. The aim of this Center will be to determine on a scientific and technical basis the most rational methods for the utilization of wood and wood products and to develop new processing methods. It will also be the function of this Center to stimulate scientific and technical research with a view to improving the yield, as well as the quality and esthetic appearance, of processed products. The Center is also entrusted with the task of collecting and disseminating information. The results of its work will be available to all industries. It may, should its program permit, assist industrial concerns for their own benefit, but also at their own expense. To that end the Center will enjoy great freedom of action and may create any service it considers necessary, organize field studies and exhibits or even grant subsidies to existing agencies. The organic structure of the Center includes a General Council composed of representatives of the wood industries, wood industry associations, and prominent scientific and technical experts. For the purpose of continuity of action, a Standing Committee and a Director will be appointed.

Belgian Congo

A paper prepared by the Belgian Ministry of Colonies at the request of the Conference of Colonial Experts in December 1947 contained data on the possibilities of the Belgian Congo. Production in sawn goods varied from 1942 to 1945 between 23,000 and 38,000 m^3 (s) and between 138,000 and 216,000 m^3 (r) for logs. Exports amounted to 34,000 metric tons in 1942 and 100,000 metric tons in 1947. The main hindrances to increased exports are the local demand for wood, problem of transportation, the resistance of buyers to exotic species, and irregular deliveries. A number of government plans have been worked out to improve rational forestry utilization. To begin with, present-day regulations will be further expanded and the new forestry system will be based on the difference between classified forests and protected forests. The classified forests will be subject to management plans covering every phase from the utilization of natural stands to their replacement by artificial stands. On the other hand, protected forests will be subject to rational utilization plans based on increment per unit of surface. The forestry program is characterized by reforestation and by letting concessions. In certain areas agriculture plantations will be replaced by forest plantations, notably of Limba, *Terminalia superba*. Forestry research will be undertaken by the Congo National Institute of Agricultural Studies. Technological research on tropical timbers will be undertaken by the forestry section of the State Institute of Agriculture at Gembloux and by the University of Louvain. The necessary appropriations for the implementation of these plans will be covered by taxes paid by forest utilizers. The problem of labor supply will be dealt with by bettering living conditions of the native forest workers. Plans are being made for the establishment of veneer factories and distillation plants as well as for pulp mills. Mechanization of sawmills will help eliminate waste. The forest services are developing rapidly.

France

The training of forest agents for privately owned forests, which constitute more than half of the forest lands of France, was until very recently practically nonexistent or left entirely to the initiative of individual forest owners. The National Association of Forest Owners and Silviculturists of France has just taken steps to bridge this very serious gap, at least in part, by organizing correspondence courses for training private forest guards.

The Water and Forest Resources Service has lent its assistance to this undertaking and has organized sessions on typical silvicultural operations. Students taking the correspondence courses will be asked to attend these sessions which are to be conducted by specially selected instructors.

The National Association also contemplates to organize, at a later stage, regional courses of instruction in forestry.

A tropical forestry research institute, *Institut des Recherches Forestières Tropicales*, is being established at Nogent-sur-Marne, thus expanding the existing laboratories within the framework of the technical section of tropical agronomical science. The new institute will continue the work already started there on a larger and better endowed scale for all tropical forestry areas of the French Empire. The Institute will work in close collaboration with the local tropical staffs and forest services. The Director of the Institute will be guided by an advisory body composed of scientists and technicians interested in tropical timbers. The review, *Bois et Forêts des Tropiques*, will carry the institute's work to the general public.

Guatemala

Guatemala has announced a project to put 50,000 European Displaced Persons in the forest lands of that country. Albert Dupont Willemin, Guatemalan delegate to the International Refugee Organization, said the project was Guatemala's contribution to the solution of Europe's refugee problem.

Mexico

A new comprehensive law administered by the Department of Agriculture and Stockraising is designed to check deforestation. Loss of timber and extinction of important tree species have been the consequences of the gradual disappearance of the forest. Erosion, dust bowl areas, and uncontrolled floods are of particular importance in arid country like much of Mexico. The desire to provide rural recreation areas and tourist areas has also found expression in the law. Local forestry boards are headed by state forestry boards and culminate in the National Forest Council. The implementation of the policies brought forward from the local level and finally decided on by the National Forest Council will be entrusted to a General Forestry Administration. Severe restrictions govern the cutting of trees on publicly or privately owned land. Planting is mandatory. The clearance of woodland for agricultural processes is permissible only after expert judgment has confirmed the choice. Government nurseries will give particular attention to disappearing species or to species gaining in commercial value. Grazing on government lands and national parks will be subject to permission. Restrictions are placed on exports of wood and forest products. Domestic wood consumption is also to be checked by the use of preservatives for piles and crossties, etc. The law embodies the fundamental tenet that the country's forests are a public utility.

United States of America

Particularly because of previous overcutting and fires, the forests of the Lake States now produce less than half of the local regional sawn-timber requirements; the balance is obtained from the forests of the western United States. It is believed, however, that if it were possible to bring the forests back into full productivity they could supply local needs.

On the other hand, during the last few years half of the volume of soft-

wood consumed in local wood-pulp factories was obtained from Canada, particularly from Ontario. Six months ago the Ontario Government announced a major reduction in its exports of pulpwood.

In order to cope with this serious situation, the Federal Service and the Lake States Experiment Station recommend a vast research program with a view to:

a) reducing forest waste and improving wood utilization methods;
b) modifying the pulping processes in order to make a more extensive use of aspen and hardwood stands;
c) intensifying silviculture;
d) increasing imports from the Rocky Mountains.

Meetings and Conventions

The First North African Congress on Fruit and Vegetable Packaging was held at Algiers from 8-11 March 1948. The Congress expressed its desire to standardize packaging practices in the three French territories of North Africa so as to bring them into line with metropolitan practices. In its opinion, large-scale standardization tests constitute the sole means of achieving such standardization. The Congress requested that the results of such tests be studied at a second North African Congress, whose task it would be to draw conclusions therefrom and to suggest to the public authorities of the territories concerned new regulations adapted to the conditions and requirements of production and trade.

The First Congress of Research and Technical Chemists was held in Helsingfors, Finland on 21 and 22 February. About 400 chemists were present at the opening meeting and heard Dr. Bertil Nyberg, Managing Director of the Central Laboratory of the Finnish industry, speak on the significance of basic research for general technical purposes. Dr. Nyberg first reviewed the development of technical research in the big industrial countries and stressed how it became necessary during the recent war to resort to basic research, particularly in the field of chemistry and physics. Fundamental scientific study developed new approaches to the interpretation of technical problems and surprising results were attained. The work has therefore been continued.

In Finland the problems are the same as elsewhere, but the facilities are restricted. The main bodies are the A. B. Centrallaboratorium, working essentially for the woodworking industries, the State Technical Research Institute, the Biochemical Research Institute, and the Research Laboratory of the Defense Forces. Financial resources are limited; the state does not find it possible to allocate sufficient funds for academic study, and it has not been possible to employ a sufficient number of specialists for the technical research institutes. In order to surmount these shortcomings, Dr. Nyberg stated that he had initiated an arrangement between A. B. Centrallaboratorium and the universities whereby specific problems could be submitted to academic teachers for investigation. In this way he hoped that technical development in Finland could keep abreast of that in the large industrial countries where enormous resources are available.

The Northeastern Wood Utilization Council of New Haven, Connecticut, has made a preliminary announcement of a conference on the chemistry and utilization of bark. The Conference is scheduled to be held in Boston, with the co-operation of the Massachusetts Institute of Technology on 17 September 1948. The conference will include specialists on the chemical and industrial aspects of bark, with contributors from research institutions and industry. Developments in bark utilization from pulp and paper mills, as well as from sawmills and lumbering operations, will be reviewed.

The world congress of paper, stationery, and kindred trades, which Hungary is arranging in celebration of the centenary of its war of independence, will be held at Budapest from 29 August to 3 September 1948. The Congress will be attended by official representatives of associations or organizations of manufacturing, wholesale, or retail merchants of paper, stationery, etc. and by individual representatives. The purpose of the Congress is to survey the position of paper products on the world market; to consider development and establishment of international connections; to discuss actual problems of the trade; and to establish an international paper and stationery association.

Switzerland has offered to organize the general conference of the International Union of Forest Research Organizations in September 1948. At this conference, the question of the liaison to be established between the Union and FAO will be reconsidered. As the annual report of the Union for the year 1947 contains misconceptions of this liaison, further examination of the question by both FAO and the Union is under way.

Personalities

Monsieur Pierre Gazonnaud (France) has been designated Chief of the Forest Service of the Ministry of Overseas Territories. He is replacing Monsieur Pierre Terver, now on the staff of FAO.

Mr. Harold R. Murdock, past vice-president of the Technical Association of the Pulp and Paper Industry, and formerly director of research for the Champion Paper and Fibre Company, has been awarded the first Murdock Medal by representatives of the Japanese pulp and paper industry. Mr. Murdock is the head of the Pulp and Paper Branch of SCAP's Natural Resources Section. The award was made in recognition of Mr. Murdock's help in re-establishing the paper industry in Japan and introducing the semichemical process which increased the yield of wood pulp by 35 percent. He also established a rayon pulp plant having a monthly yield of 4,000 tons. Another process introduced by Mr. Murdock was the use of infusorial earth to check difficulties caused by pitch from the pulpwood. Locally procured volcanic ash served this purpose. He also organized the Japanese Technical Association of the Pulp and Paper Industry.

Cola G. Parker, for the last four years first vice-president of the American Paper and Pulp Association, was recently advanced to the presidency. In addition to being president of the Kimberly-Clark Corporation, he is a trustee of the National Industrial Conference Board, a trustee of Lawrence College, and a holder of other important posts in associations and institutions.

Wilbur F. Gillespie was re-elected to the post of president of the Technical Association of the Pulp and Paper Industry. Mr. Gillespie is technical director of the Gaylord Container Corporation.

Book Reviews

Wildlife Management Handbook for Forest Officers, Region 5, 1947. S. B. Show, A. G. Brenneis, F. P. Cronemiller, R. L. Deering, Ivan Sack, and D. M. Traugh. viii + 243 pp. U. S. Forest Service, U. S. Department of Agriculture, Washington, D. C., U. S. A., 1947.

A very large part of the effective habitat of many game animals, game birds, and sport fish in the western United States is in the National Forests. Control of these wildlife species rests with States, rather than with the Federal Government, under the present legal system.

The taking of game and fish is thus controlled mainly by State law, and a complex system of seasons, bag limits, etc., has grown up. Moreover, under American doctrine, with few exceptions, permits to hunt and fish are issued by State authorities to all applicants, and very large numbers of people avail themselves of their legal rights to hunt and fish. The American tradition of free public hunting and fishing is cherished; but this method of legal control can, under heavy hunting pressure, result in severe over-utilization of wildlife stocks.

Thus, the U. S. Forest Service, as custodian and manager of these nationally owned forests, has control of the habitat or environment which produces wildlife, but does not control the time or manner of taking, except in the limited areas and times when occupancy of game ranges by people would represent an excessive fire risk and threat to the game ranges and populations themselves. In such circumstances, the National Forests may be closed to all forms of use. At times, too, game animals cause damage to National Forest ranges, and under such circumstances remedial measures may be taken.

With this complex and divided system of land and of wildlife controls it is understandable that the role of field forest officers in wildlife management is complex. It is to these officers that the Handbook is addressed. The keynote to its theme is stated as follows: "Wildlife, like forests and range, is a product of habitat. Each species of animal, tree, shrub, or grass can exist under certain conditions and may vanish as any essential condition disappears or is seriously modified. . . . One aspect of wildlife management deals with direct control of each species in accordance with its values and relations to man; another aspect is the manipulation and control of the habitat. Each is necessary to supplement the other; neither can do the job alone. . . . The Handbook attempts to develop a biologically sound attitude and approach to wildlife management. It is addressed to the forest officers who control and manage the habitat and who are responsible for seeing to it that the National Forests produce all they are capable of producing, including quality wildlife values."

The Handbook then defines and discusses the what, why, and how of wildlife management and the principal fields for action and leadership by forest officers. It points out that there are several distinct groups of people having an interest in wildlife, and that the attitudes of each must be understood by the wildlife manager. It then treats of the major factors of habitat not subject to change by man, such as climate, weather, the main vegetative cover types; and the factors which are subject to change, such as food, cover, water supply, shelter, places for nesting and raising young, interspersion of cover types, predation, etc.

A further major group of controls in management, as discussed in the Handbook, contains the inherent qualities of species and populations, such as breeding habit and potential; mobility and migration; and tolerance to other species, to variable habitat and to hunting and survival factors.

All these factors of habitat and of species are summed up in a series of very useful tables which serve to emphasize the essential limiting factors for each native species. These show that there is a vast difference in survival value, some species being excessively demanding of particular combinations, others broadly tolerant of a wide range of conditions. Detailed species summaries are given.

The Handbook next covers in detail the management methods applicable to the species and habitat conditions under discussion. First, there are the preparatory steps, such as census of existing population, diagnosis of habitat factors responsible for population levels, gains and losses, and the types of management plans required.

As pointed out in the Handbook, actual management methods must be largely co-ordinated with timber, range, and watershed management, and there are found to be many ways in which minor changes in timber and range practices can benefit wildlife. There are also specific wildlife measures which can be practically carried out, such as water developments, food and cover planting, and creating edge vegetation. These practical methods are all treated through analysis of specific problems, indicating the conditions encountered and effective means for solution.

This case method is applied also to the analysis of methods to improve survival of wildlife through application of legal controls, spreading the hunting effort, control of predation, protection against disaster, and similar methods.

A section on fish management follows the same general pattern as that for animals and birds, emphasizing the habitat factors, inherent qualities, and requirements of species; steps preparatory to management; and actual management methods.

Finally, a series of appendices gives working descriptions and drawings on field operations which forest officers may apply and a useful glossary of technical terms employed in wildlife management. A well-prepared index adds to the usability of the Handbook.

In total effect, the Handbook is a useful and practical guide in fitting wildlife management into its proper place in the whole forest management program, in the area and under the circumstances covered. Above all, it emphasizes over and over that wildlife management, like forestry, is first of all a problem in applied biology, and that success depends upon working within the well-known biological laws.

Report of the Chief of the Forest Service, 1947: Forests and the Nation's Water Resource. Lyle F. Watts, Chief, U. S. Forest Service. iii + 48 pp. 15 cents. U. S. Department of Agriculture, Washington, U. S. A., 1947. For sale by Superintendent of Documents, U. S. Government Printing Office, Washington, D. C.

Last year in UNASYLVA, Vol. I, No. 1, portions of Mr. Lyle F. Watts' annual report for 1946 appeared under the title, "Timber Shortage or Timber Abundance in the U. S. A." In this report he dealt with the unsatisfactory national situation—the lack of use of forestry on the abundant available forest land to supply present and prospective needs for forest products.

In his report for 1947 Mr. Watts places first emphasis on the watersheds and on the forests and ranges which cover them. He states the scope of the report thus:

"Timber production is vital to our national economy, but it is by no means the only useful function of our forests. The forests harbor a valuable wildlife resource. Their recreational values contribute greatly to our physical and spiritual health. Forest ranges have an important part in national livestock production.

"But undoubtedly the paramount service of a very large part of our forest land is as a source of water, an erosion preventive, and a regulator of stream flow. Irrigation agriculture, hydro-electric power development, municipal water systems all depend on adequate and reliable water supplies. Good management of forest and range watersheds can reduce the danger of disastrous floods. We need clear, clean streams from protected watersheds for good fishing and other outdoor sports. Water supply determines the establishment of homes, farms, industries; communities develop only where water is available. An assured, dependable water supply is indeed essential to our State, regional, and national development. Water is an essential of life itself.

"In this year's report I should like to give special attention to our forest and wild-land watersheds. There are some encouraging things to report, but the story as a whole is not a pleasant one. Many important watersheds are in critical condition. Much watershed land is not adequately protected. We are paying a huge price every year—in heavy flood losses, erratic stream behavior, reduced water quality, sedimentation, and in many other ways—for our failure to give enough care to the highlands that water our valleys.

"This watershed situation is nothing new or sudden. In many places it has been worsening for years along with the decline of our timber and range resources, and to a considerable extent from

the same causes. But it is time we faced this problem in its full significance.

"Damaged watersheds can be repaired. Rampaging streams can be brought under control. Water sources can be kept in good condition. And to a large extent the kind of forest and range management that restores and maintains good watershed conditions will also make for increased timber supplies and increased livestock production. Recreation and wildlife also will benefit."

In documenting the statement that "many watersheds are in poor condition," Mr. Watts cites recent examples of muddy streams, flash floods, big river floods, and sedimentation and water supply problems in various parts of the nation. In summing up, he states:

"A geologic period of tremendous erosion followed the retreat of the glaciers at the end of the Ice Age. It took thousands of years for the stream courses to become stabilized and the earth to be anchored in place by trees and grass. Good soil was formed by the weathering of rock and the deposition of organic matter from vegetation. The land became rich and good for human habitation.

". . . A new period of erosion is now under way in this country as great if not greater than any that has occurred since the glacial epoch. And this one is man-made."

Then the report goes on to show, citing experience and recent research, how forest and range treatment affects watersheds. The major destructive forces of fire, overcutting of timber, improper road construction, and overgrazing are recognized as operative.

Turning then to national forest watersheds, Mr. Watts recalls that

"Watershed protection was one of the major purposes in the creation of the national-forest system from public domain lands more than half a century ago. It was largely concern over watershed conditions that led to enactment of the Weeks law of 1911 authorizing Federal purchase of lands for national forests.

"Virtually all of our national forests are sources of water of the highest importance for industrial, agricultural, domestic, and recreational use. National forests west of the Great Plains include many of the high-altitude areas that are the source of 90% of the water of the Western States. The watershed services of national-forest lands at the sources of western rivers transcend all other values attached to these lands. There is no substitute for these services." He points out that the listing of specific areas of dependence is impressive evidence of the importance of public forests and that

"The Forest Service, as custodian of the national forests, clearly has a direct responsibility in watershed management on lands within its own jurisdiction."

In discussing these special problems of the ranges, the report deals with the long-continued efforts of the Forest Service to make forest ranges available for use, but at the same time to protect fully their watershed values. It is emphasized that grazing is but one of several uses of these public properties, and that

"Any proposal that would restrict or hamper effective administration and management of national-forest lands used as range for livestock, therefore, ignores the interests of irrigation farmers, residents of valley communities, recreationists, sportsmen, and others. It would subject the lands to the possibility of the same kind of misuse that originally caused them to be included in the national forests." It is well known that such proposals are being pushed by some stockmen who have enjoyed the privilege of using ranges at low cost, but the report shows that other groups and organizations of stockmen believe that the Forest Service must retain a free hand in management. This is frank reporting of a controversy of great public importance.

In closing this section, Mr. Watts insists that "we can have good watershed management." This requires such programs as increase of upstream flood control work, expansion of public watersheds, intensification of national-forest management, improvement of forest and range practices on private lands, and provision for more research on watershed management problems. In each of these categories reference is made to past and present work, but in all cases it has been on far too small a scale.

Other sections of the report deal more briefly with the nation's timber supply, co-operation in State and private forestry, the national forests, research, tropical forestry, Forest Service personnel, and receipts and expenditures.

This annual report for 1947 fully measures up to the high standard established over many years by the series. Though prepared for domestic consumption, it will be of great interest to readers in other lands, as the most balanced and comprehensive statement available on the current problems, programs, and progress of American forestry.

Cork Production and International Cork Trade. Monograph prepared by Dr. Ernst Palmgren in the Bureau of General Statistics. 158 pp. + map. $1.50. International Institute of Agriculture, Temporary Bureau in Europe of FAO, Villa Borghese, Rome, 1947.

As a result of the development of new techniques in the building, heating, and refrigerating industries, the production and utilization of cork are of ever increasing interest. Therefore, the recent publication by the International Institute of Agriculture of a monograph on this subject is particularly opportune.

This work begins with a general chapter on the economic importance of cork. After general considerations on its formation, the methods used in harvesting it, and its anatomical, physical, and chemical properties, there follows a brief historical account of the conditions under which it is employed, ending with a review of the present prospects for its use in the industries producing corks for bottles, linoleum, and corkboards.

Chapter II discusses the production of cork and commercial trends in the producing countries. After a statement of the basic phytogeographic data concerning the cork oak and other cork trees (i.e., areas and conditions of growth), there follows some information relating to the silviculture of these species, then a detailed review of the major cork producing countries, indicating the areas involved, the specific conditions of vegetation, growth, and harvesting of cork, and data on the trade in, and the processing industry of, that commodity. Data relating to Portugal, Spain, Spanish Morocco, French North Africa, France, and Italy are successively discussed.

Chapter III, entitled "Foreign Trade of the Consuming Countries," studies the trends in exports to highly industrialized countries and the evolution now taking place in producing areas where an effort is made to process cork locally.

The prospects regarding the possible increase in the production of cork and the substitution of other products for it, are dealt with in Chapter V, which stresses the inefficiency of purely silvicultural measures. It is essential above all to ensure the protection of forest stands against overcutting and overgrazing as well as against fire and the attacks of forest pests. To this end, states and individuals, both producers and industrialists, will find it in their own interest to join together in a common organization with a view to taking co-ordinated measures of control. In this connection, the prospective utilization of the following vegetable products and synthetic substitutes is considered: the balsa tree (*Ochroma lagopus*), the "musanga," several types of tree pith, kapok, and rubber.

The work also contains a series of 12 statistical tables on the cork trade in each producing country and on world trade in raw, cleaned, and processed cork from 1925 to 1939. It ends with an interesting bibliographical index and is illustrated by a 1/12,000,000 map showing the self-sown areas of cork oak trees.

La Industria de Maderas Compensadas en la República Argentina. (The Plywood Industry in the Argentine Republic.) Eduardo F. Di Lella. 95 pp. Technical Publication No. 10 of the Ministry of Agriculture of Argentina, General Division of Lands and Forests, Forestry Division, Buenos Aires, Argentina. 1947.

After a brief historical account of the manufacture of plywood throughout the world, this publication gives valuable data in the form of charts and graphs on the importation of plywood into the Argentine Republic and on the production and export of products manufactured by that country. It also shows that the supplies previously derived from Poland, Finland, and Russia were abruptly replaced, as a result of hostilities, by large shipments from Brazil, supplemented by products from Chile, Uruguay, and the United States. General comments are followed by an interesting list of the domestic and imported tree species used in Argentina for the manufacture of plywood.

The second and most important section of this work gives a very clear description of the various stages of the plywood-manufacturing process from preparation of veneer logs to classification and packaging of finished products.

There follows a study on the production cost of one cubic meter of plywood made from white guatambu (*Balfourodendron riedelianum*), taking into account capital investment requirements and other operational expenses. In conclusion, there is given a decree stating that in Argentina the plywood industry is a matter of public interest and giving the steps to be taken with a view to protecting and developing this industry.

THE Nations accepting this Constitution, being determined to promote the common welfare by furthering separate and collective action on their part for the purposes of

raising levels of nutrition and standards of living of the peoples under their respective jurisdictions,

securing improvements in the efficiency of the production and distribution of all food and agricultural products,

bettering the condition of rural populations,

and thus contributing toward an expanding world economy,

hereby establish the Food and Agriculture Organization of the United Nations . . . through which the Members will report to one another on the measures taken and the progress achieved in the fields of action set forth above.

—Preamble to the Constitution of the Food and Agriculture Organization of the United Nations

FAO Member Nations

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Austria
Belgium
Bolivia
Brazil
Burma
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Chile
China
Colombia
Costa Rica
Cuba
Czechoslovakia
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Dominican Republic
Ecuador
Egypt
Ethiopia
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Finland
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